IN TWO SECTIONS—SECTION ONE

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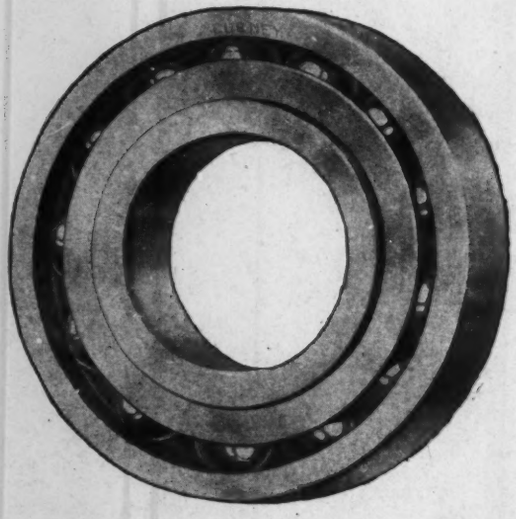

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Slow-Speed Tests of Kingsbury Thrust Bearings

By H. A. S. HOWARTH,[1] PITTSBURGH, PA.

This paper presents operating and experimental data which show the wide range of application of the Kingsbury thrust bearing, and the author gives particulars of typical installations which have been in successful operation since 1911. These bearings have been applied to vertical and horizontal hydroelectric units as well as to horizontal steam turbines and centrifugal pumps, and to determine some of the service conditions, a series of slow-speed tests was recently made on a bearing having a total area of 76 sq. in. on its four shoes and a load of 10,000 lb. Details of these tests are given, and the results obtained indicate that the lower the speed at which the bearing is run continuously, the better the conditions of the bearing surfaces. Speeds as low as 0.33 r.p.m. have thus far been employed, using, however, only a light oil.

THE Kingsbury thrust bearing in its simplest form consists of one or more pivoted segments or shoes against which the thrust collar presses as it rotates. The bearing faces are copiously supplied with oil so that perfect film lubrication takes place with its resulting low friction coefficient. This bearing was invented many years ago by Albert Kingsbury, of Pittsburgh, but it met with so much conservatism on the part of engineers and manufacturers that it was slow to be taken up. The author of this paper believes there are many engineers wrestling with thrust problems who will welcome data on the wide range of usefulness of this pivoted-segment type of thrust bearing. Whether the load be great or small, or the speed be high or low, it can be applied successfully. It is the object of this paper to present operating and experimental data to show the wide range of its application to date.

A Kingsbury thrust bearing was applied to a Morgan mill in 1911 to take the bevel-pinion thrust on the horizontal drive shaft. Its characteristics are as follows: load, 66,000 lb.; 70 r.p.m.; unit thrust load, 100 lb. per sq. in.; mean surface speed, 8.4 ft. per sec. The collar is of air-furnace iron and the pivoted shoes are babbitt-faced. It runs in machine oil. The heat of friction is dissipated by its connection with an oil-circulating system, but the bearing will lubricate itself automatically from an oil reservoir in its housing if the central-station system gets out of order. This bearing has been in successful operation ever since 1911, none of its parts has ever been replaced and today it is in first-class condition.

The next application of the bearing was in a plate-glass grinding and polishing machine in 1911. This bearing, of the vertical type, was placed below the lower end of the spindle. It was designed to carry a load of 160,000 lb. at 35 r.p.m. with a unit thrust of 980 lb. per sq. in. Its mean surface speed is 2.1 ft. per sec. On account of the high unit pressure and slow speed the collar was made of chilled iron and the shoes of bronze, and the oil used was very heavy. Its service requires alternate runs of two to three hours and stops of about one hour. A conservative estimate of the starts and stops of this machine to date is 15,000. This bearing is still in service and none of its parts has ever been replaced.

Following the above applications the Kingsbury thrust bearing began to be applied to vertical and horizontal hydroelectric units, to horizontal steam turbines and centrifugal pumps. During the war its use in these fields was greatly extended and it began to be employed to take propeller thrust. When our country entered the war the demand for turbine-driven ships advanced with a bound, which caused a similar increase in the demand for Kingsbury thrust bearings both for the turbines and for taking the propeller thrust.

The development of the Kingsbury thrust bearing has now reached such a stage that it is being used in steam turbines to take the whole steam thrust, no dummies whatever being required. One turbine thus equipped runs at 3600 r.p.m., the mean surface speed in the thrust bearing being 155 ft. per sec. This is the highest speed attained thus far, but there is no reason to believe it cannot be greatly exceeded. High surface speed is not always accompanied by high angular velocity. Tests are now being made that show the bearings will operate successfully at 15,000 r.p.m.

For *constant* low-speed operation the best operating example is the plate-glass-machine bearing described above, whose mean surface speed is 2.1 ft. per sec. Much lower speeds occur when the machine slows down to a stop. A mean operating surface speed of 2.1 ft. per sec. is not low for a heavy oil, however, even with a unit load of 1000 lb. per sq. in.

Hydroelectric units ordinarily run on light engine oils and the film thicknesses are, therefore, much less at any speed and load than would be the case if heavy oils were used. They have to start and stop under practically full thrust load, consequently that service may be considered as the most severe for thrust bearings. When one of these units slows down it passes gradually through the whole range of speeds from normal to the very low speed at which the oil film breaks in the thrust bearing. All this time the friction coefficient, and hence the torque required to turn the rotor, is reducing. When the film breaks the friction coefficient increases and the rotor is brought to rest.

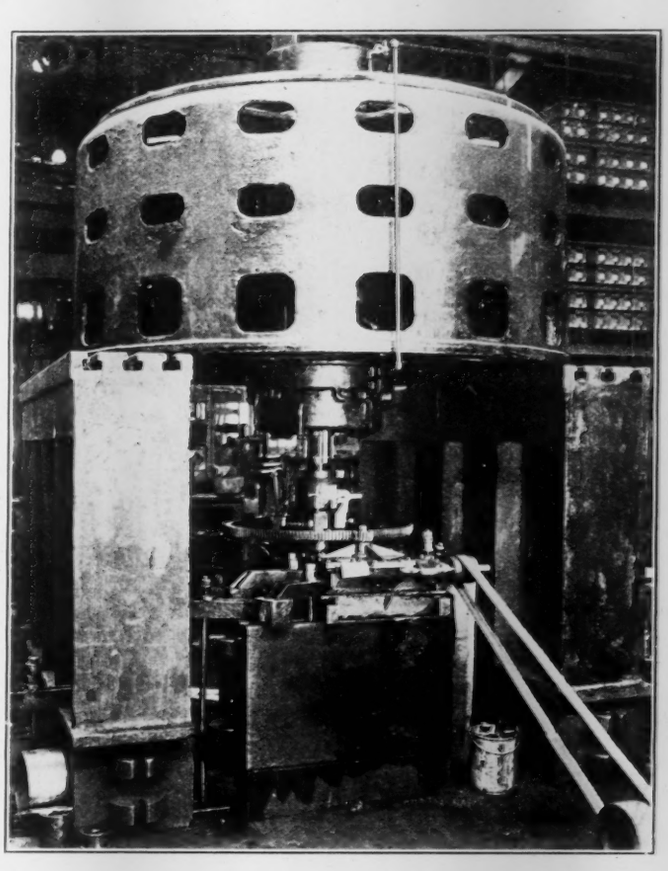

FIG. 1 VIEW OF MACHINE EMPLOYED IN TESTING THRUST BEARINGS AT SLOW SPEEDS

Consideration of these severe service conditions suggests the following questions: At what surface speed does the film break? What happens to the bearing if it continues to turn after the film breaks? Does the film break suddenly? These questions are of great importance. The slow-speed tests described later were made for the express purpose of answering them. An effort will be made

[1] Gen. Mgr. and Ch. Eng., Albert Kingsbury, Eng. Mem. Am. Soc. M. E.

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to cover the field between film lubrication and so-called metallic friction.

It is known that, in a given bearing carrying a known load, the film thickness at a given speed is greater for a heavy oil than for a light one. Hence a heavy oil will sustain a given load at a lower speed than will a light oil. It may be assumed that the oil film breaks when it gets so thin that the high spots begin to rub. If the bearing surfaces are poorly fitted the film will break at a

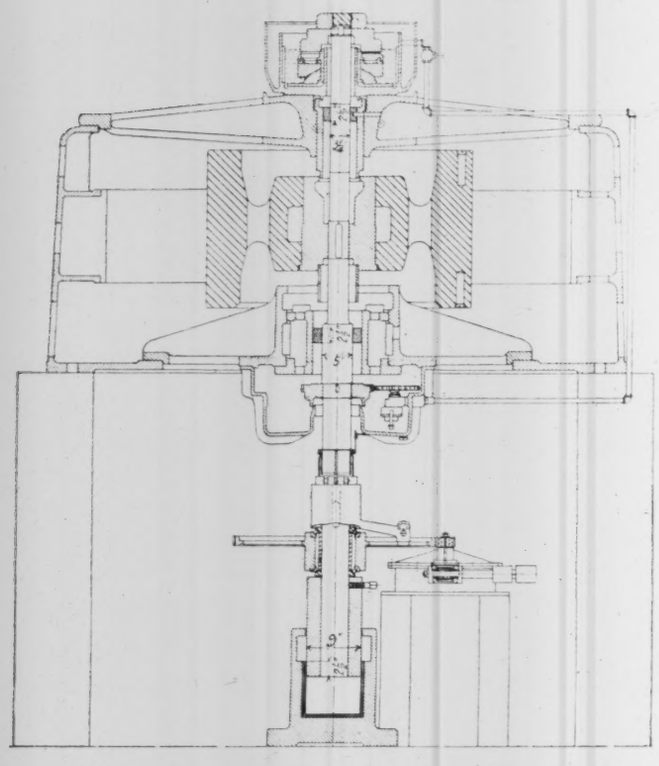


FIG. 2 VERTICAL SECTION OF THRUST-BEARING TESTING MACHINE SHOWN IN FIG. 1

higher speed than otherwise. When it is said that high spots rub on each other it is not meant that the metals come into contact with no oil between them. If the high spots are wet with oil, oil will persist in remaining between them. The local pressure may be enough to cause the softer of the two spots to be "ironed off" or crowded back out of the way. If the high spots are not of great magnitude the local heating will not be sufficient to make trouble and as soon as the high spots rub they will pass and cool. The softer high spot will recede on cooling and may even fall below the general surface. If the harder surface be perfectly flat it might iron off the soft high spots and make the soft face also flat. If the harder face is not perfectly flat the softer face will gradually conform to it as far as possible.

The machine used for the slow-speed tests to be described is shown in Figs. 1 to 4, inclusive. Power from a variable-speed motor is belted and geared down so as to produce constantly any desired low speed at the driving gear *A* which is mounted on ball bearings around the rotor shaft *B*, Fig. 3. A hub *C* is keyed to the shaft as shown in Fig. 4. It has arms *D* and *E* while the gear arm has a lug *F*. Between lug *F* and arm *D* are mounted two compression springs in a holder that is so arranged as not to bind when the springs are compressed. Angular movement between the hub and gear, by means of a suitable linkage, causes a corresponding axial motion of the ring-shaped indicator *G* that surrounds the shaft as Fig. 3. A fixed scale *H* is fastened to the machine frame. This can be graduated so that torque can be read directly. Since the load is constant the friction coefficient can be read directly on the scale if desired.

It will be noted in the section shown in Fig. 4 that two springs are used, a light one and a heavy one. When the driving gear is started its arm lug *F* moves and begins to compress the springs. The light one compresses first and then the heavy one also comes into action. When the compression of both becomes great enough, rotation begins and the springs expand as the coefficient of friction reduces from its starting values to its running value. The coefficient of running friction is so very low for a continuous film that the light spring will be compressed but little.

The following action was noted when the tests were begun: If the speed of rotation of the driving gear was not high enough to keep the shaft going fast enough to maintain a perfect film in the thrust bearing the high spots would rub and the coefficient increase, causing the shaft to stop turning. Then as the stiff spring compressed, the driving torque would become great enough to start the shaft turning again. Once the starting resistance was overcome

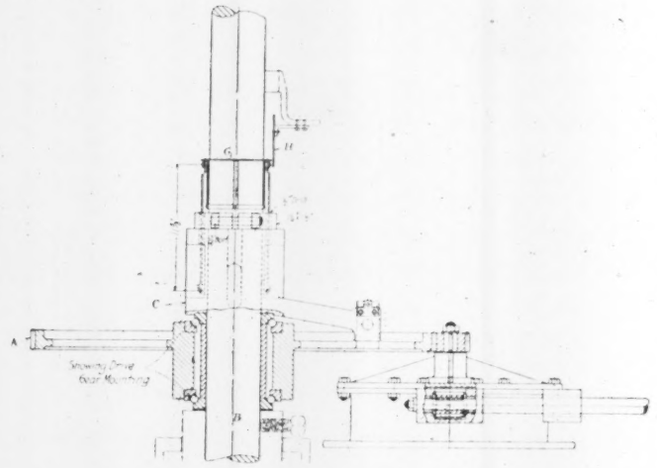


FIG. 3 DETAILS OF DRIVE-GEAR MOUNTING OF TESTING MACHINE SHOWN IN FIG. 2

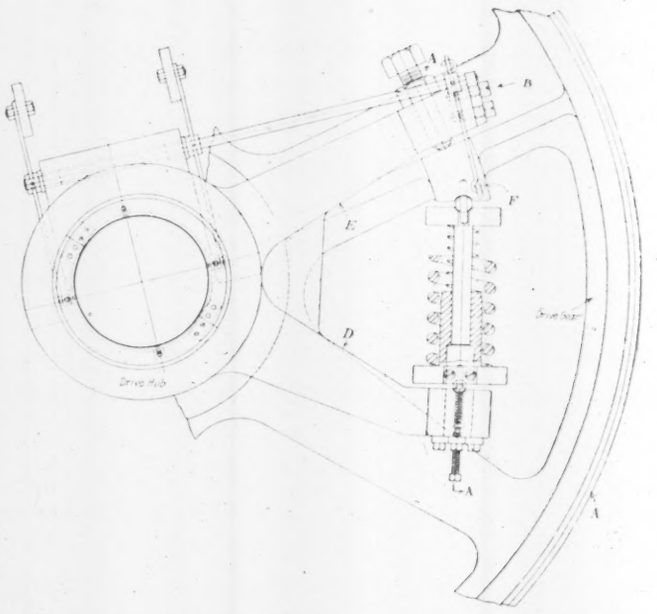


FIG. 4 PORTION OF DRIVE GEAR, SHOWING METHOD OF MOUNTING THE COMPRESSION SPRINGS

the shaft would be accelerated by the expansion of the stiff spring and would speed up sufficiently to be driven by the light spring. But as the driving gear would not be turning fast enough to keep up with it, the shaft would then slow down till the film broke again. This action would take place about every two seconds. The rotor weighs 10,000 lb. The thrust bearing has four shoes of

the form shown in Fig. 5, their total area being 76 sq. in. Hence the initial tests were run with a unit pressure of (10,000 ÷ 76 =) 132 lb. per sq in., the intention being to decrease the area later to 38 sq. in. by taking out two shoes; then still more by reducing the total area of the remaining shoes to 19.53 sq. in., 13.33 sq. in., 10 sq. in., and finally to 5 sq. in.

Before making the tests the thrust bearing, which is shown in section by Fig. 6, was carefully inspected. The face of the cast-iron collar was in excellent condition, i.e., smooth and flat. The babbitt-faced shoes were then fitted to the collar face under load. This fitting process developed some interesting features. Not knowing at how low a speed the machine would run and have a perfect film, it was assumed that the high spots would rub at 2.8 r.p.m. The machine was run at this speed for 30 min. The friction was so high that the load came on the heavy spring. The shoes were then removed and the high spots scraped down slightly. The shoes were then put back and the bearing run at 2.9 r.p.m. for 15 min. They were then removed and scraped again, and run at 3 r.p.m. After the starting friction was overcome the load was carried on the light spring and the speed kept constant for 45 min. The spring compression gradually reduced from $\frac{9}{16}$ to $\frac{3}{8}$ in., showing that the friction was decreasing rapidly. This indicated that such high spots as interfered with each other at this speed were gradually being rubbed down. The results of this first test are plotted in Fig. 7. The shoes were inspected after this run and found to be in excellent condition.

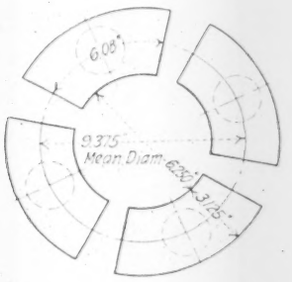
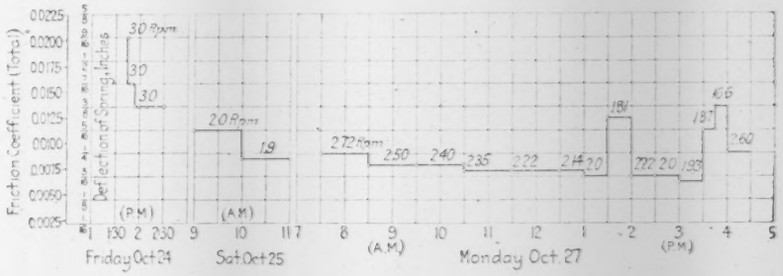


FIG. 5 ARRANGEMENT OF SHOES IN THE THRUST BEARING TESTED



FIGS. 7 TO 9 RESULTS OF TESTS OF THRUST BEARING

The next test was run on Saturday, October 25, beginning with 2.86 r.p.m. The speed was then reduced to 2 r.p.m. (see Fig. 8) and the spring compression decreased to $\frac{5}{16}$ in. It was expected that the compression would decrease with the speed so long as a good film was maintained. The machine was then run for an hour at 1.9 r.p.m., and the light-spring compression was $\frac{15}{64}$ in., showing that the friction coefficient still continued to reduce. This run had to be stopped on account of quitting time.

Tests were continued on Monday, October 27, starting with 2.72 r.p.m. (see Fig. 9). The first run showed that the friction decreased until the speed was 2 r.p.m. When an attempt was made to run at 1.81 r.p.m., the friction increased considerably — about 100 per cent. It will be noted that with a speed as low as 1.66 r.p.m. the light spring still carried the load easily.

The results of Tuesday's tests correspond very closely with the previous ones (see Fig. 10). The speed was lowered at intervals until it reached 1.9 r.p.m., the friction coefficient likewise decreasing. When an attempt was made to run at 1.71 r.p.m., the spring compression increased more than 100 per cent. At 1.5 r.p.m. it increased to almost double its value at 1.71 r.p.m.

After the run on Tuesday the thrust bearing was inspected. It was found to be in excellent condition, the shoe faces having apparently worked in so as to be a much better fit to the collar. In view of this improvement it was decided to see what would happen if the machine were run constantly at 1 r.p.m. (see Fig. 11). At the beginning of the run the heavy spring was slightly compressed. At the end of four hours the load was beginning to be carried by the light spring alone. At the end of another four hours the compression of the light spring had reduced considerably, finally reaching $\frac{9}{16}$ in. This compression remained constant for 30 min. As there was an evident improvement in the bearing surfaces, shown by the gradual reduction of the friction coefficient, it was decided to run the next day at various speeds and see whether the coefficient would reduce with the speed to a lower point than before.

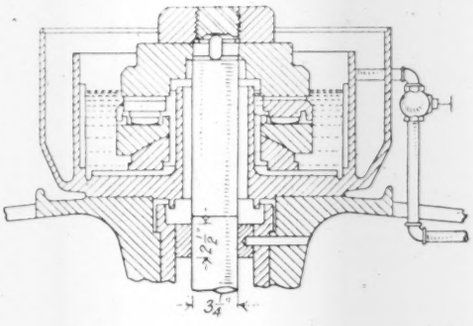
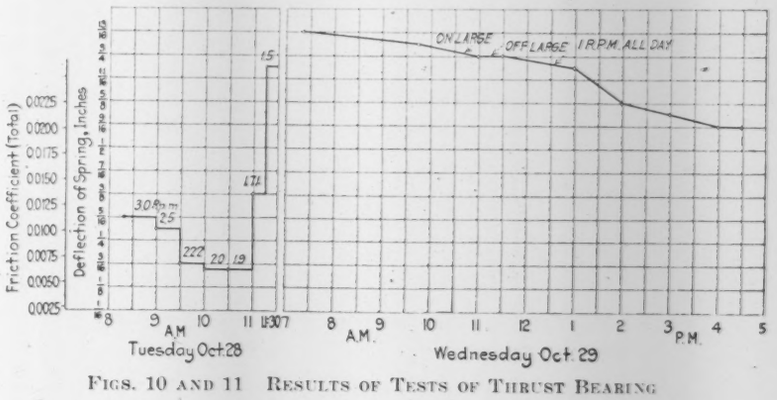


FIG. 6 SECTION THROUGH THRUST BEARING EMPLOYED IN THE TESTS



FIGS. 10 AND 11 RESULTS OF TESTS OF THRUST BEARING

On Thursday the machine was started up and run for 15-min. intervals at each speed beginning with 2.25 r.p.m. The minimum friction was obtained at 2 r.p.m. The coefficient remained constant, however, until the speed reached 1.71 r.p.m. It increased appreciably when the speed was reduced to 1.66 r.p.m. and continued to increase, though slowly, until the speed reached 1.5 r.p.m. The friction then remained constant until the speed was reduced to 1.39 r.p.m. At this point the machine was shut down.

It is evident from the foregoing that by running continuously at 1 r.p.m. the bearing surfaces improved so that the friction coefficients at speeds slightly above 1 r.p.m were less than they otherwise would have been.

(Continued on page 968)

The Hvid Engine and the Fuel Problem

By E. B. BLAKELY,[1] CHICAGO, ILL.

This paper describes a type of engine, the Hvid, which it is claimed has all the advantages and none of the disadvantages of the so-called Diesel type, and which is being produced in units as small as 1½ hp. It can be started cold, has no complicated air-compressor systems, and is so economical that it can compete with gasoline engines of the same size. The author outlines the operation of the engine, describing in detail the suction, compression, power and exhaust strokes and presenting a series of indicator cards. Fuel consumption is shown by means of curves obtained as the results of tests performed. The paper concludes with a discussion of the heat balance and torque characteristics of the engine.

IT has been estimated that there are in use now in this country, burning gasoline, nearly 4,000,000 automobiles, 250,000 trucks, 500,000 motor boats, 75,000 tractors and 750,000 farm engines. Is it any wonder, therefore, that the demand for gasoline has increased?

The visible supply of crude oil is naturally diminishing and since the oil is becoming heavier all the time, the percentage of gasoline yield, now averaging 15 per cent, is lessening.

The supply of gasoline may be increased slightly by making use of the cracking processes, which would necessitate an increased cost of production, and also by blending high-test casing-head gasoline with kerosene, a process bound to be short-lived because our gas wells are rapidly giving out. It may also be conserved by increasing the thermal efficiency of the engines and by adapting them to burn kerosene and mixtures of gasoline and kerosene. The relief gained, however, would be but temporary at best. We are having trouble enough now in burning properly the present-day gasoline without trying to burn all sorts of mixtures which at the least would necessitate constant changing of carbureting adjustments and methods.

Much has been written and said during the past two or three years on the subject of using kerosene as fuel in conventional gasoline engines of both the slow- and high-speed types, and while undoubtedly much has been learned concerning the characteristics of kerosene under certain conditions, the burning of kerosene in gasoline engines, so far as the writer knows, has not been accomplished with complete success up to the present time. By complete success the writer means starting the engine on kerosene in atmospheric temperatures approximating 0 deg. fahr. and below (for these must be reckoned with) without preliminary heating of any sort and burning the kerosene so as to eliminate troublesome carbonization and complicated and unsightly apparatus, and obtain high economy.

In attempting to burn kerosene in modified gasoline engines we are confronted by the following basic difficulties: Kerosene and gasoline are chemically widely different substances, having nothing in common but the base from which they are derived. Their initial boiling points are wide apart, that of commercial gasoline being about 100 deg. fahr., while that of kerosene is about 330 deg. fahr. Their boiling ranges are also totally different, that of gasoline being 340 deg. fahr., while that of kerosene is about 200 deg. fahr. Gasoline-air mixtures will ignite spontaneously at approximately 680 deg. fahr. while similar mixtures of kerosene and air self-ignite at approximately 575 deg. fahr. Mixtures of gasoline and air form a permanent fixed gas, but mixtures of kerosene and air do not. Under these conditions a jet carburetor designed for vaporizing gasoline cannot be expected to vaporize kerosene. The best it can do is to atomize it.

In order to vaporize, as well as to prevent precipitation or condensation of the atomized kerosene in the combustion chamber it is necessary to heat the charge, and since the power output of the engine depends upon the amount of oxygen taken in and burned during each cycle, it is clear that the more the charge is heated the less oxygen we can get into the cylinder and the less power we can obtain. This forces us to a compromise between two conflicting conditions, the maintenance of the incoming charge at the lowest possible temperature which will vaporize the kerosene and the prevention of precipitation in the combustion chamber. This compromise might be satisfactorily effected in the case of an engine running at a constant speed and load, but in the case of an engine running at varying speeds and loads it is a very different compromise to make, because as the power demands on the engine vary, so must the total amount of heat added to the charge vary.

In order to obtain maximum power from any internal-combustion engine, regardless of the kind of fuel used, we must have maximum mean effective pressure, and since mean effective pressure depends largely upon compression pressure, we must use the highest compression pressure possible. This brings us again to a conflicting pair of conditions, because in order to prevent so-called preignition with its attendant disagreeable and harmful pounding, when burning kerosene, we are forced to use a relatively low compression pressure which lowers the mean effective pressure and also the power output.

In this connection may also be mentioned the so-called preignition knock which occurs when using too high a compression pressure with kerosene. This knock is not caused by preignition, as is generally supposed, but by small detonations after ignition has occurred and the piston has started downward. These detonations are due to the fact that kerosene is of a very complex chemical make-up and that after ignition has started the conditions are most favorable to cracking it. Under these conditions the kerosene breaks down into simpler combinations, some of which are highly detonating, others less so, and these compounds set one another off successively, according to their stability, but so rapidly as to produce a single knock.

Many engineers believe that if the problem of utilizing kerosene for fuel in these engines now burning gasoline could be solved, the whole fuel problem would be solved. It undoubtedly would help the situation immeasurably, but the true economic solution of the fuel problem lies not in trying to adapt some particular fraction of the distillation of crude oil to the engine, but in adapting the engine to the available fuel, whether it be crude oil just as it comes out of the ground, or some by-product of its distillation.

There have been numerous engines built in the last ten years, capable of running consistently on the various crude and fuel oils, as for instance the Diesel and so-called semi-Diesel engines, hot-bulb and surface-ignition engines. These, however, have been used mainly in marine work and in relatively large units. It is out of the question to consider making Diesel engines of much less than 100 hp. per cylinder, because of the complicated fuel-injecting mechanism and the high cost of production. The other types have the disadvantage of requiring external preheating before they can be started, and the torches used for this purpose are a source of constant danger. Electric preheating has been tried, but with little success.

Advantages of the Hvid Engine

There is an engine, however, which has all the advantages of the above-mentioned types and none of the disadvantages. This is the Hvid engine. It can be started cold on any liquid fuel which will flow through a pipe. It has no complicated air-compressor systems for injecting the fuel, no hot bulbs or torches and runs with a fuel economy on a par with the Diesel engine. The Hvid engine can be and is being produced in units as small as 1½ hp., and so

[1] Sears, Roebuck and Company.

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economically as to be able to compete with gasoline engines of the same size. Briefly enumerated, its chief advantages are:

a Mechanical simplicity
b Low fuel consumption at all loads
c Ability to start and run on any oil which will flow
d Low water-jacket losses
e No lubricating difficulties
f Constant compression
g Remarkable torque characteristics
h Absence of all electrical devices, hot bulbs and torches for ignition purposes
i Absence of all carbureting mechanism
j No carbon troubles.

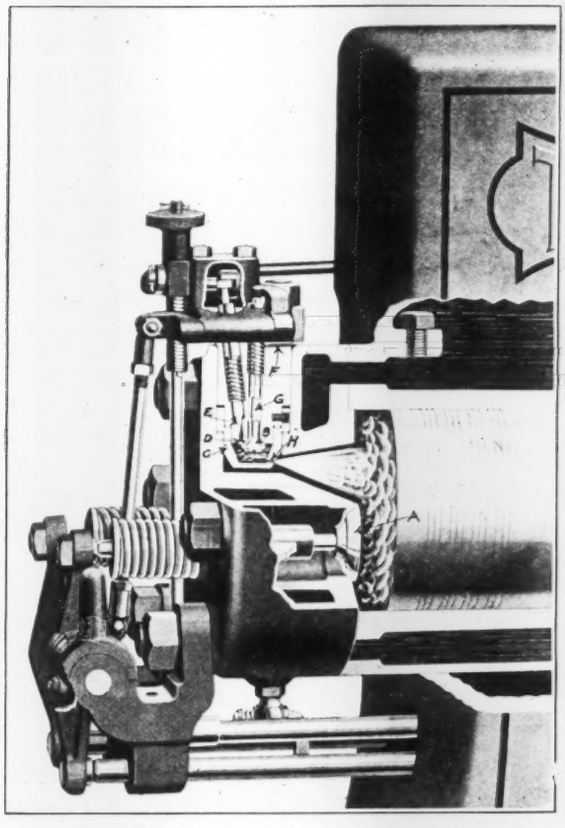

FIG. 1 CUTAWAY SECTION OF 8-HP. HVID-TYPE FARM ENGINE

The Hvid engine is of conventional four-cycle type, embodying the usual inlet and exhaust valves, timed to open and close as in any four-cycle engine. The compression pressure is carried to between 425 and 475 lb. per sq. in., which heats the compressed air to between 900 and 1000 deg. fahr. In the cylinder head there is a fuel-admission valve terminating in a small steel cup by means of which a preliminary explosion is made to force the fuel into the combustion space. Referring to Fig. 1, the Hvid cycle is as follows:

Suction Stroke. During the suction stroke pure air is admitted to the cylinder through intake valve *A*. Fuel valve *B* is opened in synchronism with intake valve *A* and some fuel flows into cup *C* out of hole *D* which is uncovered by the opening of valve *B* (the fuel enters cup *C* partly by gravity and partly by inhalation). The amount of fuel admitted is controlled by the metering pin *E*, which in turn is controlled by the governor. At the same time that the fuel is being inhaled into the cup, a small amount of fresh air is also drawn through auxiliary air hole *F*, down past a fluted guide *G* into the cup *C*. At the end of the suction stroke, fuel valve *B* and air-intake valve *A* close, valve *B* sealing the fuel-admission hole *D*.

Compression Stroke. During this stroke all valves are closed and the air admitted to the cylinder on the suction stroke is compressed to about 420 lb. per sq. in., which raises its temperature to between 900 and 1000 deg. fahr. In other words, there is now a mass of highly heated air under high pressure in the combustion chamber and this rushes into cup *C* through small holes *H* near its bottom until the pressure in the cup is practically equal to the pressure in the combustion chamber. The conditions in the cup are now most favorable to "cracking" the oil, and as the oil cracks the lighter and more volatile components are detonated by the high temperature and the resultant high pressure within the cup forces the rest of the oil out into the air in the cylinder. The amount of fuel consumed in the cup per cycle is infinitesimal because there is only a very small amount of air present in the cup to support combustion.

Power Stroke. As the fuel in an atomized and vaporous state comes into contact with the heated air in the combustion space, very rapid combustion takes place and the pressure arising from it drives the piston.

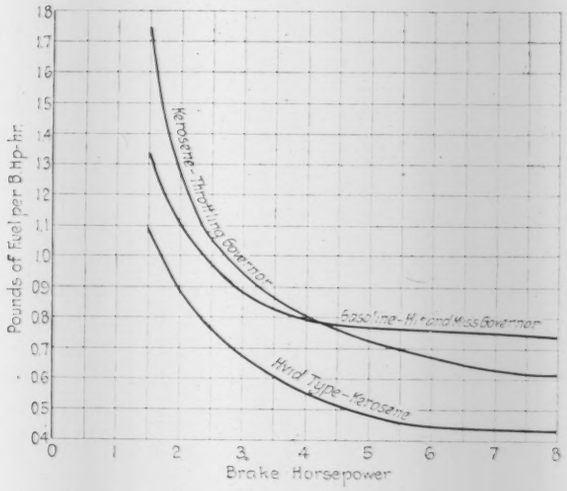

FIG. 2 COMPARATIVE FUEL-CONSUMPTION CURVES OF 5¾ × 9-IN. FARM-TYPE ENGINES OPERATING ON DIFFERENT PRINCIPLES

Exhaust Stroke. As in any four-cycle engine, the exhaust valve opens and the products of combustion are forced out by the piston.

FUEL CONSUMPTION

The fuel consumption of small Hvid-type engines is very good, being in general on a par with Diesel engines of large size. If

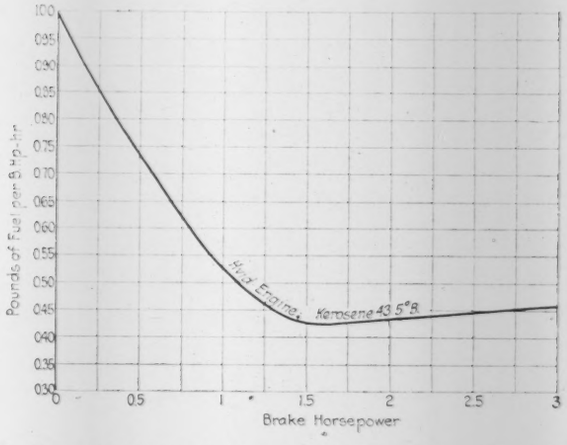

FIG. 3 FUEL-CONSUMPTION CURVE OF A 3 × 4½-IN. HVID ENGINE

Diesel engines could be economically constructed in units as small as Hvid engines can, it is doubtful whether they would compare at all favorably in thermal efficiency with the small Hvid units on account of the mechanical inefficiency of the air compressors

necessary to inject the fuel. In the comparative fuel-consumption curves shown in Fig. 2 the fuel economy of the Hvid engine as compared with two other types of the same size stands out very plainly, particularly at the lower fractional loads. The engine used in each case was 5¾ in. by 9 in., running 450 r.p.m., rated hp., 8.

The fuel-consumption curve of the small 3-in. by 4½-in. Hvid engine shown in Fig. 3 is particularly interesting because this engine, running at 1100 r.p.m. normally, is the first relatively high-speed engine of this type built. Owing to the high speed, it was natural to suppose that trouble would be encountered with the time element necessary for the introduction of fuel into and ejection

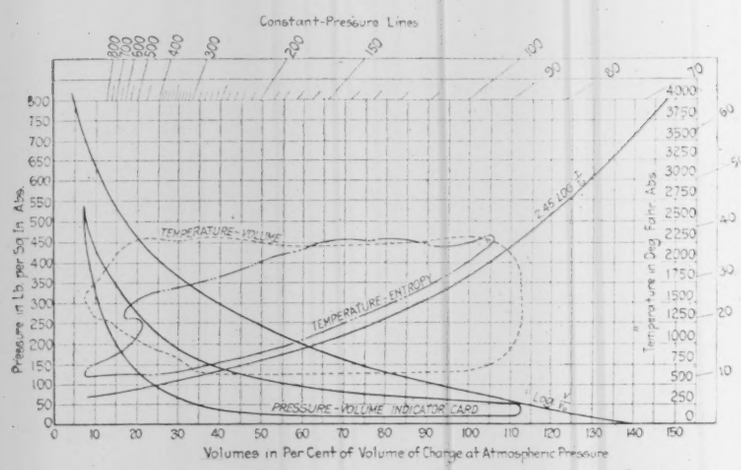

FIG. 4 VOLUME-TEMPERATURE DIAGRAM FOR A 5¾ × 9-IN. SINGLE-CYLINDER HVID KEROSENE ENGINE

out of the cup; but it was found that this little engine could be run at speeds as high as 1500 r.p.m. without any apparent interference with the perfect operation of the Hvid principle.

Entropy Diagram. The entropy diagram, shown in Fig. 4, was plotted from a pressure-volume indicator card taken from a 5¾-in. by 9-in. single-cylinder Hvid-type engine running at 450

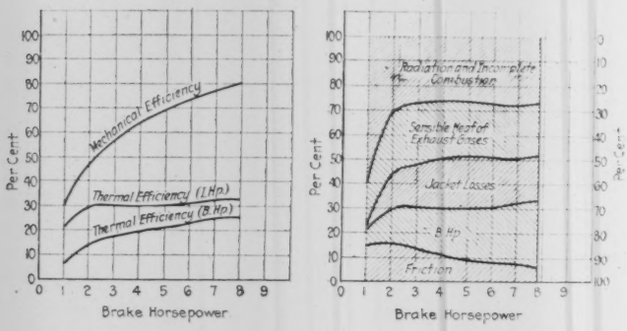

FIG. 5 HEAT BALANCE AND EFFICIENCY CURVES FOR 5¾ × 9-IN. SINGLE-CYLINDER HVID ENGINE

r.p.m. and using kerosene as fuel. This diagram is submitted because it shows the general temperature characteristics, which are quite different from those in an explosive gasoline engine. It is interesting to note the low maximum temperatures, 2300 deg. fahr. abs., as compared with the maximum temperatures for gasoline engines, which frequently run as high as 3000 to 3500 deg. fahr. abs., and also, the sustained temperature in the Hvid engine throughout the working or expansion stroke. At first glance it might be argued that this sustained temperature would be harmful because of undue heat losses to the water jackets, but since the water-jacket losses are low and the thermal efficiency of the engine is remarkably good, the writer believes that combustion in the Hvid engines takes place in the form of zone burning and that the cylinder walls are more or less insulated from the high temperatures of combustion by a layer of air which is not burnt until near the end of the stroke.

Heat Balance. This test gives the mechanical efficiency and the thermal efficiency for both brake and indicated horsepower. The test was made upon a 5¾-in. by 9-in. single-cylinder Hvid engine which was flexibly connected to a Sprague electric cradle dynamometer by means of two "Spicer" universal joints. The engine was operated under various loads and speeds with various adjustments of fuel supply, compression and cup design. The final setting was made with a compression of 390 lb. per sq. in.

Test runs, curves for which are shown in Fig. 5, were conducted at various loads from a maximum to about one-eighth of maxi

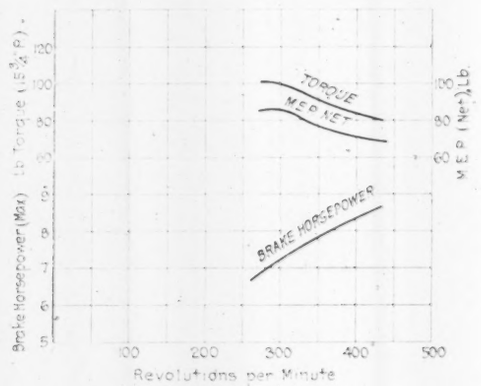

FIG. 6 BRAKE-HORSEPOWER AND TORQUE CURVES FOR A 5¾ × 9-IN. SINGLE-CYLINDER HVID ENGINE

mum load, and readings were taken to determine the following:

1 Friction horsepower (electric dynamometer method)
2 Brake horsepower (torque and speed)
3 Jacket-water loss
4 Sensible heating in the exhaust (calorimeter method)
5 Loss due to radiation and incomplete combustion (by difference)
6 Fuel consumption (lb. per hour).

Items 1 and 2 are determined directly from dynamometer reading; items 3 and 4 are calculated from observed temperatures and weights; item 5 is determined by difference; and item 6 is obtained from direct measurements. The heat value of the fuel expressed in B.t.u. per lb. of kerosene is calculated from the following accepted formula: B.t.u. = 18,440 × 40 (deg. Baumé — 10) = 19,740 for the quality of fuel used in the test runs.

Torque. In Fig. 6 are shown some of the torque characteristics of the Hvid engine. When a gasoline engine of conventional design is overloaded so that the speed drops beyond a certain point its torque drops rapidly, because a certain velocity of air must be maintained through the carburetor to pick up and vaporize the fuel and carry it into the cylinder, but in a Hvid engine, since the introduction of fuel into the cup and into the cylinder is not dependent upon the velocity of the air taken in, as the speed drops, due to overload, more fuel is admitted than at normal speed, because the time element for the introduction of fuel is lengthened and the engine consequently shows remarkable "hanging on" characteristics.

Under these conditions it is very wasteful of fuel without a doubt, but there are certain conditions where this "bull dog" characteristic is desirable, even though it may be at the expense of fuel economy.

In conclusion, the writer would say that while the Hvid engine has by no means reached its ultimate state of development, it nevertheless possesses a number of wonderful characteristics which ought to attract many internal-combustion engineers by the possibilities they hold out of helping to solve some of our fuel problems.

A New Type of Hydraulic-Turbine Runner

By FORREST NAGLER,[1] MILWAUKEE, WIS.

This paper is in the nature of a preliminary announcement describing the development of a new type of water-wheel runner which, on account of its greater speed and lower cost, is expected to largely supplant the well-known mixed-flow reaction (Francis) types of runners under low-head conditions. In order to provide a simple criterion of progress, but particularly to afford a more ready means of contrasting previous practice with the development described, the first part of the paper is devoted to an explanation of the term "characteristic speed" and its applications. This explanation, while in the nature of a repetition of much more extensive articles previously written, is thought to be desirable by reason of its peculiar adaptability to water-wheel analysis, and because it is not in as common use among engineers in general as it might be. A brief history of water-wheel development is likewise given, based on a consideration of characteristic speeds attained by successive types and during different periods of development. This history is brought up to date and includes the origin and development of the new type of runner. Finally a brief statement of the advantages and field of application of the new type is given, showing that by its use it is possible to build satisfactory machinery for heads down to one-half those previously found to be the limit, and for present head limits to go to over double the capacity of units previously used.

THE history of water-wheel development is practically covered by the developments of the last twenty or thirty years. This means that it has gone hand in hand with electrical development, which alone has made possible the utilization of large capacity units and high speeds. In the matter of speed, electrical-generator development has permitted of higher limits of r.p.m. than water-wheel designers have been able to reach under low- or medium-head and large-capacity conditions. On this account and because the limit of efficiency has long been so nearly reached, the greatest endeavors of runner designers have been directed toward increasing speed, and, as has been the case more or less with all lines of design, loyalty to precedent has largely interfered with any radical departures that might make for most rapid progress.

To permit of comparison between any two runners, or between the runners of any two periods of time, some common ground is necessary, some characteristic that can be expressed preferably in a single figure. Such a figure is available in what will be hereafter designated as *characteristic speed*. Because of its peculiar value in water-power work, though at the risk of repetition of more extensive articles already written, the original meaning and use of this term will be outlined briefly and explained by example.

To compare two water-wheel runners operating under different heads, developing different horsepowers, and running at different speeds, the first step would logically be to compute their power and speed performance under the same head. To do so, however, would leave varying horsepower, speed, and diameter, and so the second step would be one of the following:

A Recompute and compare their powers on the basis of their being so changed in dimensions as to have the same speed

B Recompute and compare their speeds on the basis of the same power.

Either method would give a positive indication of character expressed by a single figure. Basis *A* would give a *characteristic power* which serves to give the desired absolute basis of comparison, though on an exaggerated scale. This basis is used by Professor Zowski in *Engineering Record* of December 26, 1914, and as that article presents the most recently published data on high-speed runner development, comparisons given in the following paragraphs will be made on the same basis, making use of the same scales.

In general practice the speed comparison or *B* basis is made, and to make universal comparison possible the common head basis is taken as 1 ft. and the common power basis as 1 hp. Professor Zowski used a common speed of 50 r.p.m. in place of unity as that value is about the average unit speed of runners built for the Holyoke test and hence incurs the least recomputation or readjustment of mental conception as to size. The speed in r.p.m. resulting from such recomputation is the characteristic speed and is the characteristic which is used generally in hydraulic-turbine practice. This characteristic may be defined as follows:

> The characteristic speed of a runner is the speed in r.p.m which a model of that runner would have if operated under a head of 1 ft., this model to be reduced proportionally in all dimensions from the original until it will develop 1 hp. under 1 ft. head.

As an illustration of the universal application of the basis of comparison, Table 1 is given, which contains examples from actual installations; even figures, however, being used throughout. The final figure in each column is a direct indication of the character of the runner and comparison of these figures shows the relative speeds of the various types under any given condition of head and power. The universal application of this characteristic speed is evidenced by the fact that by its means the performance of any extremes of type may be compared. For example, an overshot wheel is shown to have about one-tenth the speed of the Fourneyron wheel, which was one of the types that superseded it. Similarly, modern wheels may attain from three to eight times the speed of the Fourneyron, and for that reason they have in turn displaced it.

TABLE 1 COMPARISON OF OLD- AND MODERN-TYPE HYDRAULIC TURBINES

Item	Old Types		Modern Types			
	Overshot Wheel	Fourneyron (Tremont) (Turbine)	Nagler	Usual Mixed-Flow or Francis		Impulse (Pelton)
			High Speed Low Head	Medium Speed	Low Speed Dbl. Run	Twin
Head in feet	14	14	14	200	400	2,000
Horsepower, total	50	180	500	40,000	20,000	20,000
Runner horsepower	50	180	500	40,000	10,000	10,000
Speed, r.p.m.	10	53	200	150	360	375
Runner diam., in.	144	40	72	130	72	96
Unit horsepower	0.95	3.44	9.55	14.14	1.25	0.11
Unit speed, r.p.m.	2.67	14.16	53.50	10.61	18	8.39
Characteristic diam., in.	148[1]	21.50	23.30	34.70	64.60	290
Characteristic speed, r.p.m.	2.66	26.30	165	40	20	2.78

[1] Physically an impossibility under 1 ft. head as the diameter of an overshot wheel is fixed by the head and not by power or speed. Similarly the value of column 6, while not so positively a physical impossibility, is practically so.

To obtain the corresponding figure or characteristic speed in the metric system multiply by 4.46, which allows for the slight difference in metric horsepower and for head expressed in meters rather than in feet.

The last three columns of Table 1 are indicative of the field which exists for medium- or low-speed runners. They cover head conditions where mechanical features of strength, or hydraulic conditions governing wear, limit the desirability of attaining high speed. For example, for the conditions of column 4, higher speed is readily obtainable from the runner end and is very desirable from the standpoint of generator design. The medium-speed type of runner is used from considerations of life and strength of the runner, both of which would be decreased at higher speed according to the present state of the art. Similarly, the conditions of columns 5 and 6 are best met by low-speed types, the limiting feature

[1] Allis-Chalmers Manufacturing Company, Mem.Am.Soc.M.E.

Presented at the Annual Meeting, New York, December 2 to 5, 1919, of THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS. The paper is here printed in abstract form. Copies of the complete paper may be obtained at a nominal price. All papers are subject to revision.

being generator speed, although runner design would readily permit higher limits. Hereafter in this paper comments on application will be confined to the high-speed, low-head type of runner, primarily applicable to heads under 100 ft.

HISTORICAL

Historically, the progress in hydraulic-turbine building may be excellently illustrated by noting the increases in characteristic speed that have been effected. The earliest types of water wheels were the current wheels of the flat-paddle type, used for irrigation, of which there are records antedating the Christian era.[1] These developed into the various forms of overshot, undershot, and breast wheels prevalent during the first half of the nineteenth century, very infrequently reaching a capacity of 100 hp. Their characteristic speed varied up to a maximum of possibly 3, and, as a consequence of their application to such small heads, their r.p.m. was very low, averaging probably under 20.

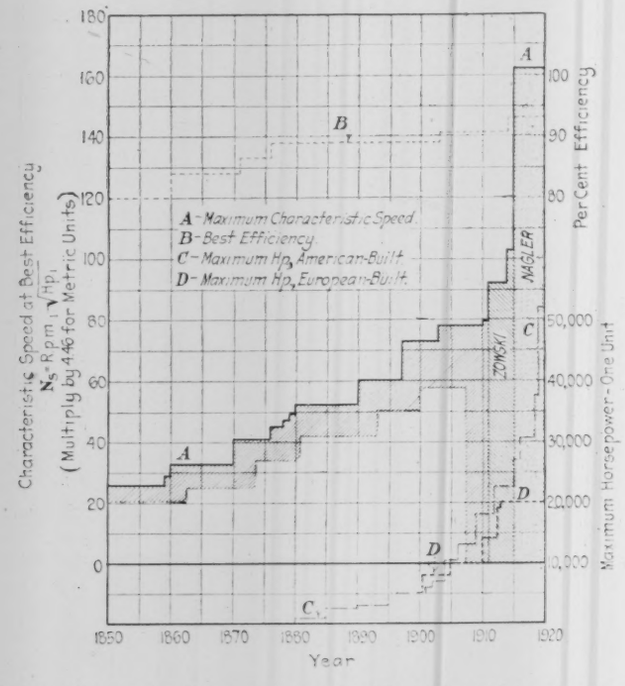

FIG. 1 GRAPHICAL REPRESENTATION OF THE DEVELOPMENT OF THE HYDRAULIC TURBINE

Lack of necessity for capacities beyond what could be absorbed by a millstone or saw and crudeness in power-transmitting machinery held capacities and speeds down to low limits. These limits began to be raised about 1825 and the turbine types of water wheel soon displaced their cumbersome predecessors. From about 1825 to 1840 two Frenchmen, Fourneyron and Jonval, developed two general types which were the forerunners of the turbine as it is known today. These are respectively the radial (outward)-flow and axial-flow types, and are still known by the names of their originators, both of whom, according to records, had exceptional knowledge of hydraulics. These types of wheels were developed both in Europe and America with efficiencies exceeding 80 per cent, but demands for speed and capacity were such as to limit specific speeds to between 20 and 40 and capacities to considerably under 1000 hp.

The next radical step is found in our present form of mixed-flow turbine, which resulted from successively increasing the capacity of the radial-inward-flow type of turbine until the buckets or vanes received the water radially and discharged it axially. This is the type of runner used for low-head work up to the present time, it being designated originally under various trade names such as Hercules, Sampson, Success, New American, and by the names of various designers. More generally it has been known as the reaction or Francis type, though strictly the latter name may not be applied to the mixed-flow runner as appropriately as to the pure radial-inward-flow type which Francis brought to a high state of perfection around 1870.

The mixed-flow runner which has been used in developing probably well over 90 per cent of all the water power produced in the world from medium to low heads has had most of its development and reached its highest state of perfection in America. This statement is based on the fact that record performances in size, efficiency, capacity, and head of hydraulic turbines have been made and held in America throughout the greater part of the period covering modern turbine development.

Fig. 1 has been prepared to illustrate graphically the history of hydraulic-turbine development as outlined above. These curves embody the most authentic data available and, while there may be particular points not entered or not enveloped by the lines shown, their form would be affected to a negligible extent by their inclusion. Curve *B* illustrates the extent to which practical limits of efficiency have been reached. That most rapid progress has dated from the nineties is very strikingly brought out by curve *A* of characteristic speed and curve *C* of turbine capacity. Both of these criteria of improvement go hand in hand with electrical development. Curve *A* further indicates that characteristic speed was advancing by only moderate amounts, although its improvement had been steady for a considerable period. It is this curve which points out the radical nature of the increases effected by the new type of runner forming the subject-matter of this article, its characteristic speed exceeding previous records by over 50 per cent at the outset. The increases made by Zowski in 1911 and in 1914 when characteristic speeds of approximately 90 and 102, respectively, were attained, were the subject of the most widespread comment among engineers and were the basis of great advance in the design of low-head, direct-connected units.

Since the speed of a runner is directly proportional to its characteristic speed, inspection of Curve *A* will indicate that under any given conditions this new type of runner will permit of speeds over 50 per cent in excess of those possible heretofore. The effect of such an increase will be instantly apparent to any one who is familiar with the extensive efforts made to increase electrical gen-

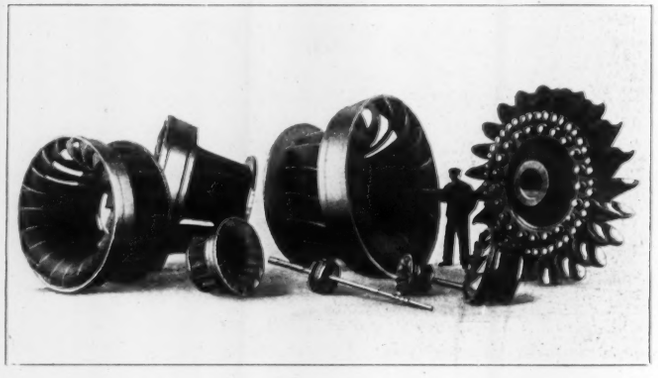

FIG. 2 TYPICAL GROUP OF MODERN MIXED-FLOW, REACTION (FRANCIS) RUNNERS CONTRASTED TO IMPULSE-TYPE WHEEL SHOWN ON THE RIGHT

These two types are the basis of practically all hydraulic-turbine development since about 1900, with the exception of the type of runner forming the subject-matter of the paper. Characteristic speeds are about 3 for the impulse wheel and from 25 to 95 for the reaction wheels.

erator speed in hydroelectric plants by means of belts, gears, the multiple runners of twin, quadruplex, and even octuplex turbines, etc. The high cost, complication, loss of power, and departure from simplicity of such devices are fundamental disadvantages that only elimination will correct and this elimination has heretofore been attained at the sacrifice of speed. The generator builder and the owner who pays for the unit and the plant to house it are then the individuals most concerned, the former with design difficulties, the latter with increased cost, and both with lower efficiency. The plant at Keokuk is a striking illustration of this feature, direct connection and large capacity being obtained only by using speeds

[1] Roman and Chinese particularly.

between 50 and 60 revolutions per minute as contrasted to the 90 or 100 readily obtainable with the new type of development.

DEVELOPMENT OF THE NEW RUNNER TYPE

In 1907 and 1908 the author was connected with some rather extensive field work, comprising erecting, experimentally improving and testing of some large-size axial-flow or screw pumps. This work concentrated all attention on a single type of hydraulic impeller for over a year, and it was only natural that impressions then formed should greatly influence his trend of thought in later work, which has been exclusively along hydraulic-turbine lines. At any event the effect was such that the accepted form of reaction (Francis) runner, illustrated typically in Fig. 2, then and still the basis of practically all low-head turbine design, seemed unnecessarily complicated and without logical justification from any hydraulic or mechanical standpoint. These ideas crystallized in 1913 when definite application of the axial-flow principle was shown as giving inherently less wetted surface, simpler passages and greater mechanical strength than the corresponding reaction runner having radial inlet and axial discharge.

To bring out the comparison most effectively the initial drawings showed the axial-flow runner sketched in on the outline of the reaction runner, using the same runner band and showing the additional advantage of being able to use either the usual radial inlet guide case or the straight axial case. Most, but not all, of subsequent commercial applications have been along the former lines, but, undoubtedly, the still greater simplicity effected by the latter, especially in horizontal settings, will bring it into prominence. Models were made with the least possible delay and theories checked

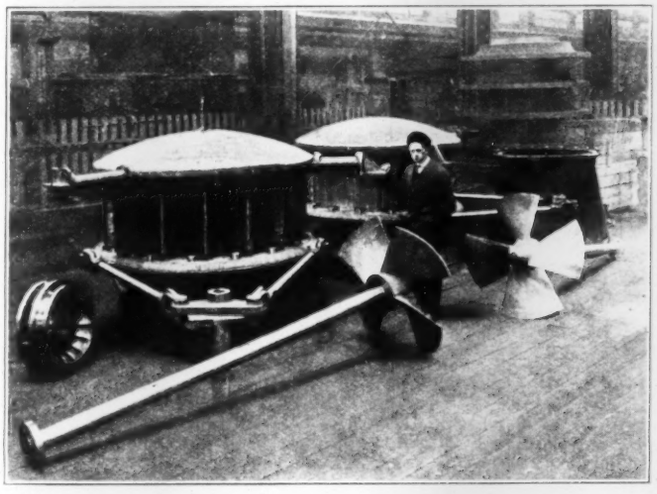

FIG. 3 ONE OF THE FIRST COMMERCIAL APPLICATIONS OF THE NEW "SUCTION" TYPE OF RUNNER DESIGNED IN 1916

Two units were constructed for a rating of 100 hp., 8 ft. head, 225 r.p.m. At the left is shown a high-head Francis wheel having about one-eighth the characteristic speed of the new type of runner, the characteristic speed of the former being about 20.

out practically with actual runners. New lines of improvement naturally became evident during trials, but the original profiles were left fundamentally intact, with the result that the form of turbine runner shown in Fig. 3 was developed. Inspection of this figure reveals the fact that the entire design is based on a straight radial blade, which offers the absolute minimum of wetted surface and of bending moment on the root of the blade. It is by reason of these two fundamental advantages emphasized by the simplicity and inexpensiveness of the design that the author believes the new type of runner will supersede the mixed-flow or Francis type. Runners of practically the axial-flow type, but roughly conical in profile, may possess certain desirable features of strength or form of passage, but the measure of their advantage is largely indicated by the nearness with which they are found to approach the flat form.

Commercial installations of any considerable size were naturally approached with the greatest care, as it was difficult to anticipate what effects there might be due to the critical state of water resulting from the high velocities used. The initial small plants designed in 1916 operated without any difficulties with regulation such as might have been expected, nor did commercial operation show any noticeable difference from previous types.

Tests on models were verified by Holyoke tests in 1917, the initial design being used partly for commercial reasons and partly for historical purposes. Only one design of blade was tested, although two runners, one having three and the other four blades, were also given runs. A typical set of results of these initial tests will be found in Table 2 of the complete paper, and although they do not equal in efficiency later tests obtained on improved runners, the figures were nevertheless used in plotting some of the curves in Figs. 4 and 5. Comparisons are confined to speed and capacity

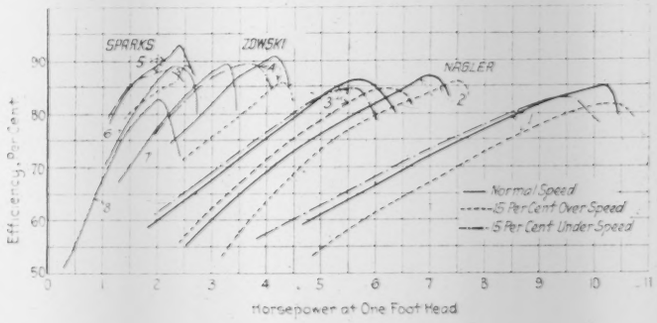

FIG. 4 POWER-EFFICIENCY CURVES FOR WHEELS HAVING A NORMAL SPEED OF 50 R.P.M.

for the purpose of this description and previous best results are accordingly also plotted in Figs. 4 and 5. The basis of these curves is taken directly from Professor Zowski's comparisons in *Engineering Record* of December 26, 1914, and it should be noted that they are plotted to show comparative powers on the basis of constant speed as outlined previously herein, although a common basis of 50 r.p.m rather than unity is used. This power basis exaggerates the comparison considerably over the characteristic-speed basis, but is retained to permit of direct reproduction of curves showing results typical of the state of runner development prior to the author's work.

Fig. 5 is a reproduction of the "equal efficiency" diagram of the December 26, 1914, *Engineering Record* article. The scale has been extended to permit of showing the relative location of the new point of best efficiency and the great flexibility inherent in the new form of runner. The diagram of runner No. 3 is shown at the right on repeated abscissæ in order to avoid too much overlap of diagram and consequent confusion. The ordinates remain the same. The shape of the "efficiency hills" is somewhat different from that of the mixed-flow runner, although perhaps not as much so as might be expected from the great difference in runner forms. That the guide cases (gates) were of the same design for both forms may be somewhat responsible for the runner not showing greater diversity in characteristics.

Fig. 5 presents an excellent basis for showing the contrasting speed characteristics of runners. Obviously their having been recomputed to 50 r.p.m. causes all the highest efficiency areas to lie on the same vertical line. This simplifies comparison in that the horizontal width of the equal-efficiency areas indicates flexibility of the runner or its ability to maintain good efficiency under varying speed or head, the latter being the variation encountered in commercial application. The position of the highest efficiency area on the vertical ordinate indicates whether it is of a high-capacity or low-capacity type or similarly whether it is a high- or low-speed runner. Its suitability for low-head work is determined largely by its vertical position.

COMMERCIAL ADVANTAGES

Up to date seventeen commercial runners of this type, varying from 80 to nearly 1000 hp. in capacity, have been built or are building for a total of nine plants. Nine of these have been tested out thoroughly in place with an actual showing of characteristic speeds often over 200 (in the metric system 900) under abnormal low-head conditions when synchronous speed was maintained during high water.

Numerous and sometimes unexpected advantages have been found to result from the simple and open form of runner. For example, a runner may be taken out and another substituted for

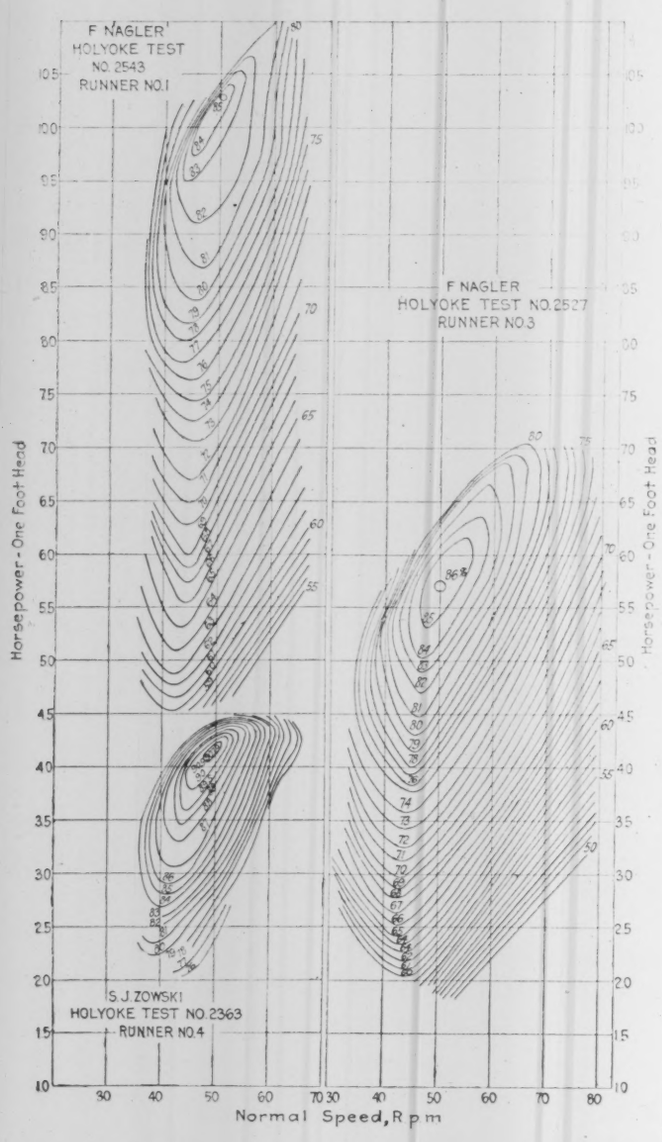

FIG. 5 COMPARISON OF THE ZOWSKI AND NAGLER TESTS

capacity variation under flood conditions or for test purposes without removing any other turbine parts except two or three guide vanes. In two plants this was made use of to install a high-capacity runner for obtaining more power during flood periods. Likewise these higher-capacity runners were made by using the original core boxes, which means that blade angles were unchanged, the result being accomplished simply by using a different number.

The greatest mechanical advantage arises from the fact that the runner cannot clog up with sticks, blocks, leaves, or other debris, a feature which the author's experience with the average low-head installation would indicate should result in several per cent more power the year around.

The primary advantages which were anticipated and which have proven out in practice are as follows:

a Lower generator cost due to an increased speed of 50 per cent and over above previous practice. This saving varies from 15 to 35 per cent of the generator cost, depending on its size and speed

b Lower turbine cost due to simpler runner. This averages around 10 per cent, the runner being about one-third the weight of the corresponding mixed-flow type and much easier to build, either solid or with separate blades

c Smaller generator diameter, which in turn means a smaller power house

d Higher generator efficiency due to better design possible with the higher speed. This is seldom less than 2 per cent gain and may conservatively be stated to vary from 1½ to 3 per cent

e Greater turbine flexibility, which permits the plant to give more power under flood conditions when the head is greatly reduced. This runner has an overspeed of about 100 per cent as contrasted to perhaps 60 to 75 per cent for previous types. This means that its efficiency and consequently its power will not become zero until the head has been reduced to about one-quarter normal as contrasted to four-tenths or one-third normal for reaction types. This advantage lies not solely at the extreme limit of minimum head, but at all abnormal heads or speeds, as the efficiency is less affected than with the other types. (See Fig. 4, showing abnormal-speed curves.)

At the present time efficiencies equaling the records of reaction (Francis) wheels have not been reached, but they are being approached rapidly and with the inherent advantage of better generator efficiency, equivalent combined results for the unit are only a matter of short time. Fundamentally the axial-flow runner should give greater efficiency than the mixed-flow purely from considerations of wetted surface and hydraulic friction, to say nothing of the simpler form permitting of greater accuracy of construction and more correct design.

TYPE OF RUNNER

As to the nature of this new type of runner, it may be said that from direction of flow it is undoubtedly a pure Jonval type, although his runner consisted of a narrow row of blades on the periphery of a comparatively large disk, and his characteristic speeds seldom exceeded 20 or 30 as contrasted to the present 100 to 200. Furthermore the Jonval type was a pure reaction wheel, which infers jets issuing from orifices or channels, these being noticeably lacking in the runners of Fig. 3.

Professor Baudisch in some of his mathematical studies on the design of high-speed axial-flow runners has introduced a type name which translated literally is "suction jet," the conclusions from his calculations being that in order to produce extraordinarily high characteristic speed it is essential to run into certain underpressure conditions such as result when velocities greater than $\sqrt{2gH}$ are produced in the throat of a diffusing nozzle discharging under a head of H feet. The term "suction turbine" impresses the writer as being quite appropriate, but from another reason which may be outlined as follows: Underpressure is not essential to high characteristic speed, though it may frequently occur. The primary essential to high characteristic speed (125 to 200) is a reduction of hydraulic friction and harmful centrifugal forces. Neglecting friction and possibly blade thickness, there are no mathematical or hydraulic laws that will prevent doubling or quadrupling any particular characteristic speed by simply flattening the blade angles. A direct analogy to this is the well-known illustration of relative velocities evidenced in the sail of an ice boat. The practical effect of so doing with a given profile is to lengthen the blade so that the friction on the increased wetted surface reduces efficiency and speed or results in constriction of passage. In the author's design these effects are counteracted by cutting out blades, the effect of which is not manifested in the reduction of power that might be expected. On the contrary the discharge is increased *without* reduction of efficiency.

Investigation of thrust and power shows that the force on each

blade exceeds the product of blade area and the total apparent head, which can only mean that in such cases there is less than atmospheric pressure on the back side of the blade aside from that due to draft head. This is strictly analogous to the distribution of the total force on the wings of an airplane, less than half of which is pressure from below, the remainder being suction on the upper surface. As such suction action is in evidence primarily with these high speeds, the author believes the term "suction" to be peculiarly applicable to this form of turbine runner.

It may be of interest to engineers who have studied runners to note the high coefficients obtained with this type of design. At normal speed the runner has a peripheral coefficient ranging as high at 2.00 as contrasted to the usual 80 to 85 per cent. Similarly at runaway speed the peripheral coefficient is around 4.00 or a speed four times as fast as the full spouting velocity ($\sqrt{2gH}$) of the driving water. At Holyoke it was very unexpectedly necessary to remove the brake pulley in order to safely measure runaway speed. This high limit is quite at variance with the usual trend of decreasing runaway speed as the characteristic speed increases. The lowest-speed runners or the impulse type have the high overspeed of about 100 per cent, a result which reaction (Francis) runners approach less and less closely as their characteristic speed increases from 10 to 100.

It is difficult in practice to secure these high characteristic speeds

FIG. 6 AN EARLY TYPE OF TURBINE

without correspondingly high velocities of the water at the runner discharge. Such high exit velocities running from $0.50 \times \sqrt{2gH}$ up to $0.80 \sqrt{2gH}$ would incur tremendous efficiency losses were no draft tube or diffuser used. On low heads and large capacities a long, straight tube is usually uncommercial on account of the excessive excavation involved and some form of a radial-outward-flow type is practically necessary. White's "Hydraucone Regainer" is the most perfect commercial solution of this diffuser problem yet found for general conditions, and practically all of the installations using the author's runner have been furnished with this hydraucone built either of steel or concrete.

CONCLUSIONS

In conclusion it is probably well to outline a few of the possibilities resulting from the development of this runner. In pointing these out it is realized fully that such features as the limit of application to higher heads and possibilities of pitting can only be determined by practice.

In low-head plants where all large power is to be developed it is desirable to use units as large as are feasible. Practical limits, however, are set by generator speed and by size of parts which may cause difficulties in manufacturing, transportation, or in placing these out it is realized fully that such features as the limit of limit is raised by the new design in that for any given generator speed more than double the power can be developed per unit than with the mixed-flow types of reaction wheel.

More general though equally significant illustrations of the extent to which the new type of runner may increase possibilities of hydroelectric development are afforded by the consideration of the following: With any given limit of minimum generator speed and for any given power, the new type of runner will permit turbines to operate under heads one-half as high as those required by the mixed-flow (Francis) runners of prior practice. Similarly, for large powers such units can be developed with low runner cost and without transportation difficulties. As an illustration, this design is the basis of some contemplated units of 800 hp. each under 9 ft.

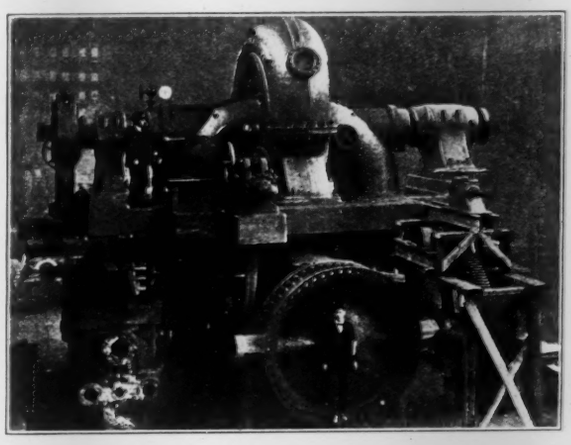

FIG. 7 A 25,000-HP. DOUBLE-DISCHARGE TYPE OF STEEL SPIRAL-CASED FRANCIS TURBINE OPERATING UNDER A HEAD OF 485 FT.

head at 90 r.p.m., a design which, it may be said, incidentally eliminates all gates on the turbine and effects all regulation from gates which form part of the power house on the discharge side of the turbine.

Probably the most novel application is to horizontal plants where it is necessary to replace old turbines but desirable to retain the electrical equipment. This has been done practically, a single high-speed runner replacing an old quadruple turbine and giving the same speed and more power with the same head.

Applying an axial-flow guide case with two 45-deg. bends in the draft tube gives as simple flow as possible with any arrangement and contrasts very favorably with the four 90-deg. bends given to the water with a radial-guide-case setting of a horizontal unit. This arrangement and, when floods are prevalent, the single vertical setting using a hydraucone regainer are probably the most advantageous forms of hydraulic-turbine settings that can be devised.

To a generation of engineers whose practical connection with water power has been based almost exclusively on the use of one type of turbine the author's statements as to the short period of time covering real progress may seem somewhat overdrawn. However, one need only look back a comparatively short time to perceive that modern water wheels are young compared to other forms of prime movers. This was never brought to the author's attention more forcefully than by consideration of the views shown in Figs. 6 and 7. The former is reproduced from a photograph presented to the author by William G. Fargo, of Jackson, Mich., and shows a single vertical open-flume turbine having about an 18-in. *wooden* shaft, which was squared at its lower end to receive the four flat paddles forming the runner. Water was admitted through crude "rabbit trap" gates diagonally opposite each other. This wheel was in operation under about 9 ft. head driving a millstone up to a very few years ago, less than fifteen if memory serves correctly. Fig. 7 shows one of the most extreme types using a mixed-flow reaction or Francis runner. This turbine, if not actually in operation at the same time as that shown in Fig. 6, missed being so by but a very few years. That two such extremes so nearly overlap in period of time is the best evidence the author can offer to the effect that the field of hydraulic-turbine design still offers tremendous opportunities for improvement.

Air Pumps for Condensing Equipment

By FRANK R. WHEELER,[1] CHICAGO, ILL.

This paper is devoted to a consideration of past and current practice in air-pump design and selection. After presenting a classification of air pumps the author proceeds to describe briefly the features of each type, stating their limitations and respective advantages and disadvantages. Special attention is given to the steam-jet ejector type of pump, whose advantages are stated to be: extreme simplicity, reliability and flexibility, stability, minimum space and weight, low steam consumption and high efficiency; and furthermore that it requires no maintenance or attention. The author concludes his paper by discussing the selection of an air pump of proper size and capacity for a given condenser installation, and accompanying this discussion are illustrative calculations with references to charts.

THE past few years have brought about decided changes in three component parts of a steam power plant: (*a*) The steam turbine has replaced prime movers of the reciprocating type; (*b*) mechanical stokers of fuel have increased boiler efficiency and ratings; (*c*) improved condensing equipment is now used which will maintain vacua of 29.5 in. referred to a 30-in. barometer under operating conditions and with proper water temperatures. The improvement in condensing equipment is primarily due to the better designs of air pumps adopted and to the radical changes and innovations that have been introduced since 1914, and the following review, dealing with past and current practice in air-pump design and selection, is submitted in the hope that it will prove of interest.

Air pumps may be classified as follows:

- Displacement
  - Wet-vacuum pumps, handling liquid and vapor
    - Simple, 3-valve decks
    - Edwards
    - Rotrex
    - Mullan
  - Dry-vacuum pumps
    - Simple
    - Two-stage
- Impulse
  - Rotary
    - Leblanc
    - A.E.G.
    - Roturbo
    - Thyssen
    - Weir
  - Ejectors
    - Water
      - Koerting
      - Kinetic
      - Müller
      - Radojet
    - Steam
      - Evacter
      - Leblanc
      - Briguet
      - Occluder

As most of these types are well known to engineers, but little attention will be given to the older designs.

Displacement Pumps

Wet-Vacuum Pumps. "Wet"-air pumps have proven their merit for more purposes and duties than is often realized, and are still excellent pumps for units up to 1500 kw. For larger units, however, it is necessary that the rotative speed be reduced, in which event they become both cumbersome and expensive and take up a large amount of space. The volumetric efficiency of these pumps varies from 60 per cent at 3 in. partial air pressure to 18 per cent at 0.5 in. partial air pressure, and since they handle both the water of condensation and vapors, at high vacuum the partial air pressure soon becomes very low unless the condensate is refrigerated by flooding the lower banks of tubes in a surface condenser.

Dry-Vacuum Pumps. The next development was the separating of the handling of condensate and vapors, introducing what is commonly known as the "dry-air" pump. Wet-vacuum pumps of the type previously described were first used with a small quantity of water admitted for sealing purposes, a separate pump being provided to remove the condensate. Later the dry-vacuum pump made with small clearances and handling air only appeared, and this type has the same general advantages as the "wet" pumps, but with better volumetric efficiencies. With improvements like flash ports, introduced by Wellner, to momentarily connect the clearance space at the end of the compression stroke with the vacuum side of the piston, both suction and discharge valves being closed, and using two-stage pumps with double and single cylinders, this type has held its own in the demands for high vacuum and increased sizes. And, except for its complications, the number of moving parts, maintenance, size, space requirements, etc., its use cannot be criticized.

The increase in the size of turbines coming into general use, however, together with the continuous demand for higher vacuum, called for dry air pumps of cumbersome size and excessive cost, and the solution of this problem seemed to point to an ejector air pump of some form, using water as the motive fluid.

Hydraulic-Entrainment Air Pumps

In 1862, Christian Schiels, of Oldham, England, invented a hydraulic-entrainment air pump which expelled the air from a condenser by combining or entraining it with hurling water in its passage through a fan or centrifugal pump. The necessary water pressure was provided by means of a high-speed rotary device and this, together with the relatively small space required and ability to maintain a high vacuum, offered such desirable features that, when the demand had exceeded the limitations of the dry-air pump, development came very rapidly. These pumps took two general forms: In one the air is entrained in the same chamber containing the rotating element. In the other the entrainment or compression of the air is performed in a part of the apparatus entirely separate from that producing the pressure of the hurling or entraining water. These pumps follow the simple ejector principle, using single or multiple jets of water, discharging into a combining cone or diffuser and entraining the air due to the high velocity of the water jets. Under favorable conditions this type will be found satisfactory, its limitations being the amount of water that must be pumped and the necessity of keeping the nozzles thoroughly clean; for the pump must have water, and as it has very definite limitations in its air-handling capacity, it becomes very unstable when called upon to handle air in excess of the designed quantity.

These water ejectors are occasionally used in series with some form of a steam jet which acts as a booster, and they usually take their water supply from a small centrifugal pump connected in parallel with the circulating system.

The hydraulic-entrainment type of pump has given complete satisfaction in performing the function demanded of an air pump, i.e., removing air and vapors from the condensing chamber and maintaining as low pressure as is consistent with circulating-water temperatures. But against the many advantages and satisfactory performances must be balanced the disadvantages. Hydraulic air pumps, using water as their working medium, are subject to erosion, and on account of the necessarily small passages, or sharp edges of vanes, presented to the water, must have clear, clean water or the falling off in capacity and efficiency is very rapid. In

[1] Dist. Mgr. C. H. Wheeler Mfg. Co.

Presented at the Annual Meeting, New York, December 1919, of The American Society of Mechanical Engineers. The paper is here printed in abstract form. Copies of the complete paper may be obtained at a nominal price. All papers are subject to revision.

most cases these essential requirements necessitate a tank for the hurling water, screens, and incidental attention thereto. And on account of the simplicity of the apparatus when compared with the rotary dry-vacuum pump, the admitted high power consumption has been accepted as a necessary evil and provision made to equalize the heat balance by providing electric drive for other auxiliaries.

STEAM-JET EJECTOR AIR PUMPS

The ejector principle is an old one, the use of steam as a medium and applied as a vacuum pump having been patented in England in 1868, but for high-vacuum service the ejector pump has not been in general commercial use in this country until the last three years. It is now, however, a definite engineering and commercial success, one manufacturer having actually delivered ejector pumps to serve over 4,000,000 hp. of prime movers.

Before outlining the development of the ejector air pump, the reason for its adoption may be considered by reviewing the advantages claimed for it, namely,

a Extreme simplicity
b No maintenance or attention
c Reliability and flexibility
d Stability
e Minimum space and weight
f Low-steam consumption, high efficiency.

The first advantage enumerated, while the most important, may be passed over as obvious. The second advantage results from the fact that there are no moving parts to wear out; and, because there are no moving parts to oil or adjust, the only attention required is that of opening and closing the valves controlling the pump.

The third advantage claimed is one that will carry the most weight with engineers in charge of power production, because with them continuity of service is of first importance. As is well known and shown later, the air leakage varies greatly and provision must be made for leakages largely in excess of those expected with good operation. With other types of air pumps than those being considered, particularly rotary dry-vacuum pumps, it is usual to provide a pump large enough for maximum requirements and operate at reduced speed or displacement. This has the serious objection of making the entire unit dependent on a single-air pump operating inefficiently. With ejector-type pumps, on account of their small size, weight and space requirements (no foundations being required), the total estimated air-removal capacity can be provided by two or more units, one or more of which can be operated as required, thereby providing maximum efficiency and insurance against shutdown. And the size of units can be so selected that one only is sufficient with a tight condensing system. Another desirable feature is that the necessity of using a second pump is an indication that unusual air leaks exist, and a third advantage is the maximum steam economy resulting from only as many pumps being used as are actually required. The adoption of ejector air pumps by the navies of the United States and France, and the United States Emergency Fleet Corporation supports this claim.

The fifth claim is clearly demonstrated by the following comparative figures for weight and floor space required by three types of pumps for use with a 7500-kw. surface condenser:

Type of pipe	Floor Space	Weight, lb.
Rotary dry vacuum	10 ft. × 22 ft.	31 000
Hydraulic	5 ft. × 10 ft.	6,300
Ejector	1 ft. × 1 ft.	450

As a general rule, for plants of ordinary size (excluding units of 20,000 kw. and over, where better results are obtainable) it may be said that with ejectors without intercondensers less than 1 per cent of the total steam consumption is required for surface condensers, and from 2½ to 3 per cent for jet condensers; for intercondenser ejectors the percentages are approximately one-half these values.

One of the early developments of the ejector using steam jets in series for high vacuum was by Leblanc for his refrigeration system. He was able to obtain an absolute pressure of 0.05 in. Hg, and later applied his design to air pumps for condensers with marked success. The general design is shown in Fig. 1.

This ejector has a single nozzle in the first stage which entrains the air and compresses it in the diffuser, from which it is discharged into a mixing chamber where it comes in contact with the steam from a large number of nozzles of the second stage, the steam and air from the first stage being entrained and compressed to atmospheric or discharge pressure in the second diffuser.

It is well known that ordinary single-stage ejectors work best and are most stable when the compression ratio is approximately one to seven, and it is for this reason that two stages are always employed in steam-ejector air pumps. The ratios of compression in the two stages should be kept as nearly equal as possible, although for maximum economy over varying loads it is found in practice that the best results will be obtained by making the ratio

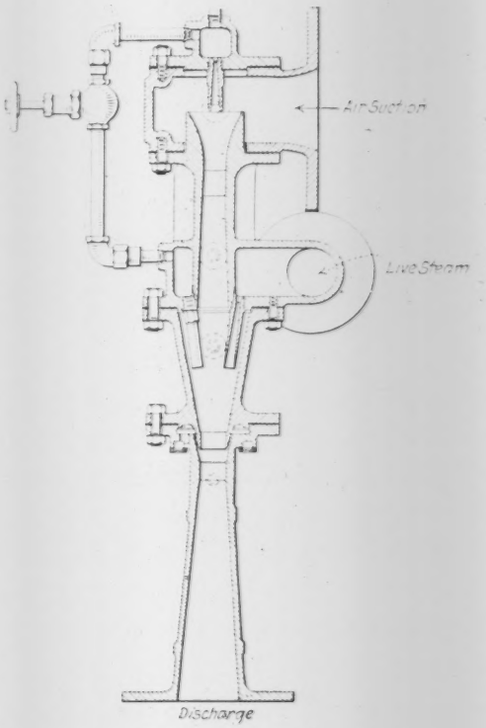

FIG. 1 SECTIONAL VIEW OF LEBLANC EJECTOR

of compression in the first stage equal to or greater than that in the second stage.

As has been mentioned before, hydraulic air pumps operate almost entirely by use of the kinetic energy of the motive fluid. The entrained water vapor, carried over with the air, condenses on coming in contact with the water and uncondensable vapors are entrained, either between sheets of, or with small globules, of water and compressed by kinetic energy in the diffuser.

The action in a steam ejector is somewhat different, where there is a fluid to be compressed, moving at a very low velocity, which must be acted upon by steam issuing from nozzles at velocities varying from about 3000 to 3500 ft. per sec. It is quite evident, then, that the operating steam must entrain the air by friction, and also that a maximum entraining surface of the operating steam is of prime importance.

This means that either a number of small cylindrical nozzles must be used, or some special form of nozzle be substituted to give a greater superficial area per unit of steam used. This is of most importance in the second stage, where 70 per cent or more of the steam is used, and may be accomplished in any one of three ways. The first method, that of using a large number of small

nozzles, is objectionable, on account of the difficulty of obtaining effective entrainment with the nozzles in the center of the group. And where the nozzles are placed concentrically or surrounding the first stage diffuser, only half of the exposed steam area is effective.

In the second method a concentric steam nozzle is employed. This nozzle is sensitive to pressure fluctuations and exposes only a small portion of its superficial steam area to contact with the air.

In the third method, using a single steam nozzle in which an adjustable nozzle point spreads out the jet and causes it to flow radially as a thin sheet of steam, the air is entrained on both sides of the sheet and compressed in a radial diffuser surrounding the nozzle. This is the general form of the Radojet air pump illustrated in Fig. 2.

Referring to Fig. 2, steam is admitted from the boiler to the strainer cage *A*, a part being passed through the pipe *B* and strainer *S* to the first-stage nozzle chamber *C*. The steam expands in the nozzles *D* and passes across the suction chamber *E* at a velocity of approximately 3000 ft. per sec., entrains the air and the vapors from the condenser and compresses them in the diffuser *F* to a higher absolute pressure. The mixture of steam and entrained vapors passes into a double passage *G* so arranged as to come into contact with both sides of the sheet of steam, and issues radially from the second-stage nozzle. Steam is simultaneously delivered through strainer S_1 and nozzle throat *H* to contact with the nozzle point *J*, which spreads the steam radially into a thin sheet of steam issuing at a high velocity and passing across the mixing chamber *G*, entraining the commingled air and steam (or the air only, where an intercondenser is used) and carrying them into the annular diffuser *K*, where the mixture is compressed to atmospheric or discharge pressure and then discharged through the volute and opening *L*.

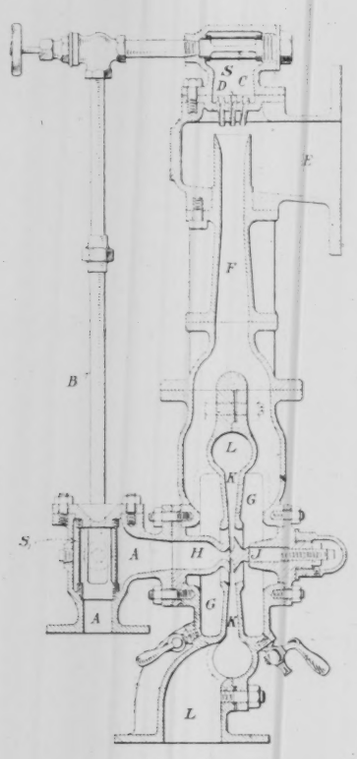

FIG. 2 SECTIONAL VIEW OF RADOJET AIR PUMP

From 70 to 90 per cent of the total steam used passes through the second-stage nozzle. The thin sheet of steam issuing radially from the adjustable nozzle point *J*, by having both sides of the sheet in contact with the air to be entrained, exposes the maximum surface possible for entrainment and secures for this design the highest efficiency and economy. The nozzle point *J* being adjustable permits of varying the cross-section of the nozzle passage and changing the expansion ratio of the steam. This is a factory adjustment and made to secure the maximum efficiency of each individual pump. The first-stage nozzles and both diffusers are made of bronze and the second-stage "Radojet" of special steel. The parts described show absolutely no wear or erosive effect in service.

Ejectors with and without intercondensers are now made by practically all of the condenser companies.

SELECTION OF AIR-PUMP CAPACITIES AND SIZES

The selection of air-pump capacities and sizes has always been shrouded with considerable mystery and the methods to employ should be given more publicity. Air is admitted to the condensing chamber in three ways:

a From leaks in the system, under vacuum
b From entrained air in the boiler feedwater carried over with the steam, and
c From entrained air in the injection water (in jet or barometric condensers only).

The size of air pumps to use with surface condensers, where only *a* and *b* in the preceding paragraph apply, will be considered first. The early air pumps were of the wet type, and textbooks and handbooks of not many years ago gave a rule that the displacement of the air pump should be a function of the low-pressure cylinder displacement. And on this basis, or on the proportions of a successful installation, most air-pump sizes were then selected. Later a rule making the displacement a function of the volume of condensed steam was very generally used and proved to be very satisfactory. This called for ratios of swept displacement of the air-pump cylinder to the volume of condensate of:

20: 1 for 26 in. vacuum	40: 1 for 28 in. vacuum
30: 1 for 27 in. vacuum	53: 1 for 29 in. vacuum

For rotary dry-vacuum pumps of good design the ratio of displacement to volume of condensate for 28 in. vacuum seldom exceeds 35 to 1.

The introduction of ejector pumps using water or steam required that some other method of selection be used. And the adoption of ejector- and entrainment-type air pumps and the general use of large units also called for a more accurate method of selection of sizes. For a number of years experiments and investigations have been made on the effect of air leakage on vacuum heat transfer, etc., all of which have indicated that the presence of only a small amount of air has a very detrimental effect. The relative coefficient of heat transfer as referred to steam was shown by Josse[1] to be 1 to 700. This caused the large operators to introduce periodic tests of their condensers for air leakage, which was accomplished by discharging the rotary dry-vacuum pump into a gasometer.

These periodic tests showed some unexpected results: That a 30,000-kw. unit need not necessarily have a greater air leakage than a 20,000-kw. unit, and that it was possible to keep air leakage to extremely low quantities, dependent on (*a*) the care exercised in installing the condensing equipment and (*b*) on the care in operation, or rather the willingness of the operating engineer to go after small leaks. That a system can be made practically air-tight can be demonstrated by shutting down the air pump while the unit is under load, Fig. 3 showing results as reported on a 10,000-kw. unit at the Boston Elevated Station. Here a drop of only 0.30 in. Hg in 30 min. indicates that there was very little entrained air in the steam and practically no air leakage.

The purchaser of a condensing equipment insists that the manufacturer guarantee the vacuum, but with this inquiry, in which he specifies the amount of steam to be condensed, water temperature, etc., he neglects to state how much air he intends shall be allowed to leak into the system. And the writer contends that this is almost as important a factor as the quantity of steam. For this reason the condenser manufacturer is compelled to do a great deal of "educated guessing." We know that with the ordinary system,

[1] *Engineering* (London), vol. 85, 1908.

using open feedwater heaters, the amount of air mechanically entrained in the feedwater is reduced to 1 per cent or less. Orrok[1] showed reductions of entrained air from 4.325 per cent in raw water to 0.9319 per cent in the heater. The air quantity from this source is in direct proportion to the quantity of steam condensed. Leakage through glands, joints, connections, and the materials of which the condenser and the low-pressure stages of the turbines are made, is a function of its size and tightness. Assuming the same care in manufacture and makeup, then size also is a function of quantity of steam condensed and we may assume total air leakage as a factor of the quantity of steam condensed.

In arriving at our figures there are some very uncertain factors to be taken into consideration: Shall we assume the best operation possible, weekly tests for leaks, etc., or the operation of a shiftless attendant satisfied with a spring gage? Inasmuch as the manufacturer is interested in the prosperity of his customer, he assumes the former, and to be sure of his own guarantee, provides for the latter. It is generally known that under good operative conditions the speed of a rotative dry vacuum pump can be cut to one-half its rating, and that there are other times when the full capacity is needed. It is therefore excellent practice to supply air pumps of capacity in excess of the anticipated requirements.

Calculation of Dry-Air Leakage in Surface-Condensing Equipment

Based on a *tight system and first-class operation*, the amount of *dry*-air leakage to be expected with surface-condensing equipment is shown in Fig. 4. It should be noted that this is dry air and is less than the capacity to be provided by the air pump, because, in passing through the condenser this air becomes saturated and the air pump must remove with the air an amount of water vapor dependent on the pressure and temperature of the mixture.

It will also be noted that the air-leakage curves in the figure are indicated in pounds of air per hour. This is done because a pound of air is a definite thing — a cubic foot of air must be specified as to temperature and pressure to have a definite meaning. To those accustomed to thinking in terms of cubic feet the approximate

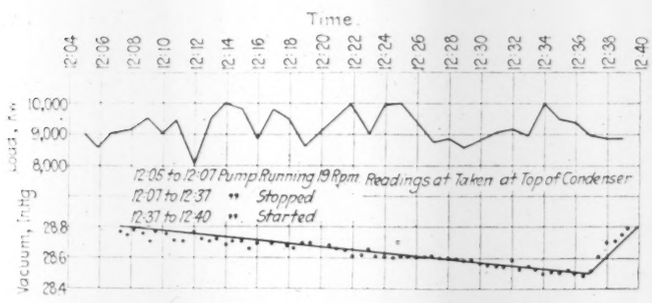

Fig. 3 Curves Showing Effect of Shutting Down the Air Pump While Unit is Under Load
(10,000 kw. unit at Boston Elevated Station)

relation of 4.5 lb. of air per hour to 1 cu. ft. of air per min. at 70 deg. fahr. and atmospheric pressure, will be of some assistance.

According to Dalton's Law, the total pressure in the condenser is the sum of the partial vapor pressure, corresponding to the temperature of the mixture, as taken from the steam tables, and the partial air pressure due to the air or other gas present in the condenser. The volume of the air is directly proportional to its absolute temperature and inversely proportional to its pressure; therefore, if the mixture of air and water vapor in a condenser is cooled, the total pressure, or vacuum, remaining the same, the vapor pressure is reduced and the partial air pressure increased, with corresponding changes in volume.

For example, 1 lb. of a mixture of air and water vapor at 80 deg. fahr. and 2 in. absolute pressure, as extracted from a condenser, would be composed of 0.595 lb. of air and 0.405 lb. of water vapor. Let this mixture be taken from a colder part of the condenser so that its temperature is reduced to 70 deg. fahr., and the relative weights will be changed to 0.724 lb. of air and 0.276 lb. of water vapor; or, to do the same effective work an air pump with a displacement only 0.595/0.724 or, approximately, four-fifths as large would be required. The problem may also be considered as the determination of the total weight of saturated mixture that must be removed from a condenser to extract 1 lb. of dry air, and Fig. 5 has accordingly been plotted to show the weight of water vapor that must be removed from a chamber containing saturated air and vapor to remove 1 lb. of dry air at different temperatures and pressures. These factors must be used in conjunction with Fig. 4.

For example, assume a 10,000-kw. surface condenser condensing

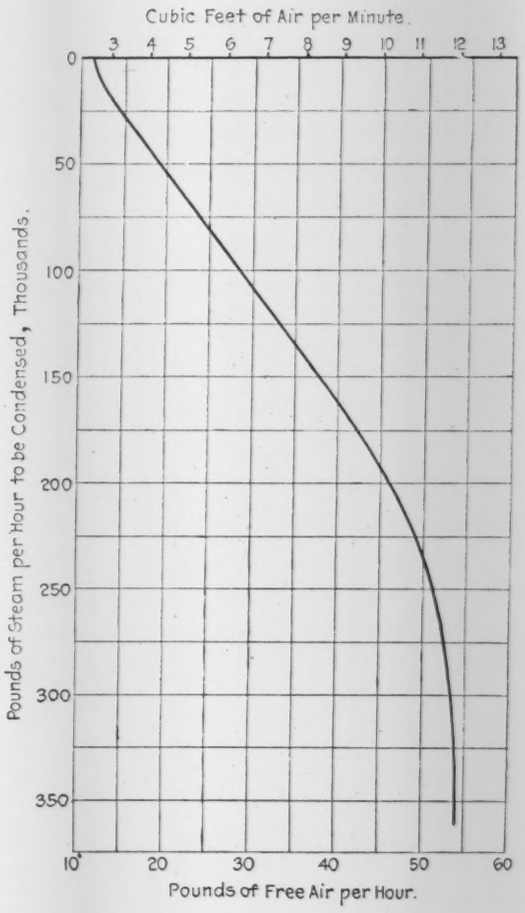

Fig. 4 Estimated Quantity of Air to be Removed from Surface Condenser with Tight System and Good Operation

140,000 lb. of steam per hour, with circulating water temperatures of 60 deg. in and 74 deg. out, a vacuum of 1.5 in. abs. being maintained.

From Fig. 4 it is seen that the expected dry-air leakage with a *tight system and with good operation* is 36 lb. per hour. Under these conditions and with good design the temperature of the mixture going into the air pump should not exceed a mean of the circulating-water temperatures, or 67 deg. with a vacuum of 1.5 in. abs., as Fig. 5 shows that in order to remove 1 lb. of air it is necessary to remove 0.5 lb. of water vapor. Therefore, the air pump must have a capacity of 1.5 x 36 or 54 lb. per hour of a mixture of air and vapor at a pressure of 1.5 in. abs. to take care of a leakage of 36 lb. of dry air. Now this capacity is selected on the assumption of *a tight system* and good operation, and does not provide for emergencies. The usual way to provide for emergencies, unusual operating conditions and excessive air leaks is to select a larger

[1] Trans.Am.Soc.M.E., 1912.

pump and operate at reduced capacities, but the better way by far is to select two pumps of minimum size as indicated from capacity curves. There are several good reasons for this: A spare pump is provided as an insurance against shutdown; maximum economy of power is obtained; and the necessity of the use of both pumps is an automatic indication of excessive air leakage. The steam ejector being so small and not requiring foundations, lends itself most admirably to this selection and can be used in two or as many more units as are desirable, to provide for fractional loads and maximum economy.

Selection of Air Pumps for Jet and Barometric Condensers

In selecting an air pump for a jet or barometric condenser, capacity must also be provided for the entrained air and gases which enter with the injection water and immediately expand to the pressure being maintained in the condenser. Here we have a very uncertain item, for cold water will hold more air than hot water, and water flowing over leaves and decayed vegetable matter absorbs CO_2. The air content will be different in the water of a spray pond or a still lake, or of a slow-moving river or a mountain stream, and will vary under ordinary conditions from 1 to 5 per cent by volume. The quantity of air admitted into the condensing system with the injection water is greatly in excess of that entering with the steam and air leaks, and a considerable quantity of air

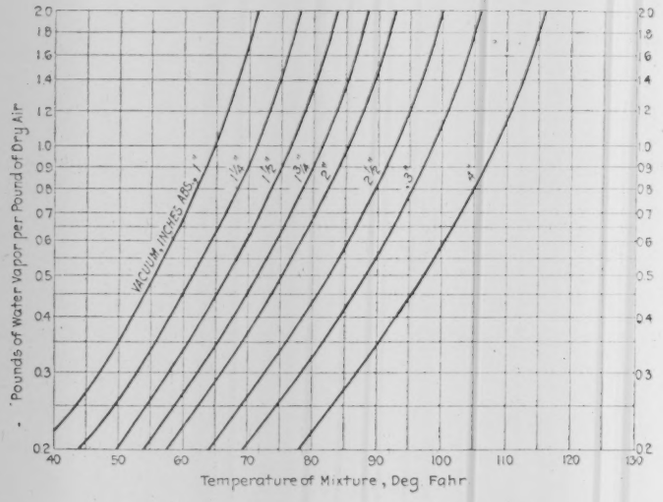

Fig. 5 Chart Showing Weight of Water Vapor That Must Be Removed from a Chamber Containing Wet Air and Vapor to Remove One Pound of Dry Air at Different Temperatures and Pressures

passes out of the system through the water-removal pump or down the tail pipe by entrainment. This latter quantity is sometimes as large as 40 per cent of the total and seldom less that 20 per cent. It is therefore assumed that the air admitted with steam and by leaks in the system passes off with the injection water, and air-pump capacity is provided only for the air entering with the injection water. Taking all these variations into consideration, *dry*-air-removal capacity for either a low-level jet or barometric condenser should be provided as shown in Fig. 6, using as before the factors from Fig. 5.

In this case it is advisable to select two or more pumps so that the total capacity is that obtained from the curve. The ejector pump lends itself to the best advantage in this selection and provides flexibility and economy when the air entrained in the injection water is not as great as anticipated.

To illustrate the selection of an air pump for a low-level jet condenser, assume a 7500-kw. unit condensing 110,000 lb. of steam per hour and maintaining a pressure of 2 in. abs. when supplied with 9000 gal. of injection water per min. at 70 deg. fahr. Fig. 6 shows that we can expect to remove 12 x 9 or 108 lb. of air per hour from the condenser. Assuming the mixture going to the air pump has a temperature of 75 deg., it is seen from Fig. 5 that with this temperature and a pressure of 2 in. abs., it is necessary to remove 0.49 lb. of water vapor in order to remove 1 lb. of air. Therefore, the air pump must have a displacement of 1.49 x 108, or approximately 160 lb. of mixture per hour at 2 in. abs. To provide this capacity in a single unit would require inefficient operation at partial loads, or when the air leakage and content in injection water is not as great as provided for. To use two or more units is also better practice, as then the entire equipment is not dependent on a single air pump.

Most steam-ejector air pumps have their nozzles designed for a fixed initial and back pressure, a pressure-regulating valve being installed in the steam supply line to automatically take care of boiler fluctuations. The maximum back pressure usually specified is 0.5 lb. gage, but this may be increased to a maximum of 3 lb. by increasing the initial steam pressure at some sacrifice in steam economy. Ordinarily, steam-ejector air pumps should be exhausted under water into a surge or feed tank so that the entire heat in the

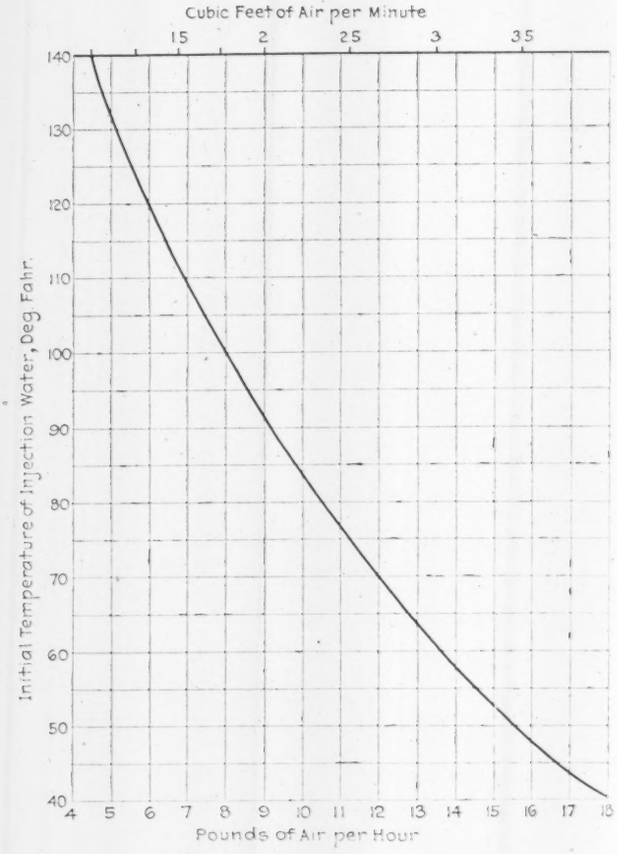

Fig. 6 Estimated Quantity of Air to be Removed from Jet or Barometric Condenser per 1000 Gal. per Min. of Injection Water

steam and air can be utilized, and the entrained air passed off through a vent. The exhaust can be into an open feedwater heater without detrimental effect, provided the heater is thoroughly vented, and also can be piped to any reasonable distance, provided pipe sizes are so selected as not to produce excessive back pressure. If the exhaust discharge is above the air-pump exhaust opening a manometer trap should be provided at the lowest point of the exhaust line, and of such length as to balance the predetermined back pressure. And a check valve should always be installed in the exhaust line from each ejector.

There is nothing to get out of order, to oil, or adjust about this type of pump, and if the screens and nozzles are inspected and cleaned occasionally the owner of a condenser equipped with steam air ejectors can be excused for exclaiming, "Why didn't some one think of this before?"

Appraisal and Valuation Methods

By DAVID H. RAY,[1] PASADENA, CAL.

This paper brings out the need of the engineer's entering the appraisal field in the full capacity which his training and experience warrant. He is likely to be more familiar with the cost and value of materials, machines and structures than the lawyer or accountant, who in the past have been the only ones considered competent to direct this work.

The author shows how the variables affecting values depend on labor, material and an aleatory factor to cover the general risk of the business, with particular reference to marketing. He also defines the terms used in appraisal work and points out the desirability of giving a value to a machine as a unit, of the grouping of similar tools, and of the use of symbols in the form of numbers and letters in tagging the materials to be appraised.

THAT appraisal and valuation work is fundamentally a matter of fair dealing and that, granted experienced technical ability and honest intent, a sensible method or procedure would produce rapid and accurate results, has long been the belief of the writer. This opinion was put to the test in recent work for the United States Government and the judgment confirmed that the difficulties of appraisal work are largely matters of honesty of purpose and of method, or, as the British call it, "procedure."

Method is born of time and consistent effort, and proven method slowly builds precedent into procedure. As in many other lines of effort, we may properly review, for a moment, European experience.

Britain, with her far-flung commercial and industrial interests, has developed methods which by custom and usage have arisen to the dignity of semi-legal and legalized procedure. The English and Scottish Law has come to provide for the certification of qualified appraisers and valuators. While the employment of such appraisers and valuators is not compulsory, a settlement out of court being entirely legal, yet should the matter come to court, the license, charter or qualification of the appraiser or valuator immediately comes into question. A qualified person may carry out appraisals or valuations without a license, but cannot enforce payment for services in the absence of private contract.

British Methods of Appraisal

The larger private appraisals of industrial plants are usually handled by firms of "chartered accountants," while the "compulsory appraisals," on complaint of a rate payer, are provided for by statutory law and by the appointment of an "official appraiser." Boards of trade have jurisdiction in matters of rates and tolls and follow the statutory procedure sanctioned by the British Parliament.

In effect, British procedure under the guidance of the lawyers and accountants has somewhat limited appraisal work to men of recognized integrity and of technical experience in values, defined the method and channel of action, and by usage and customs fixed to some extent the fees for such services. The British, therefore, have a class of professional appraisers, valuers or valuators; in America this function has, in considerable part, fallen to the lot of the engineer.

The engineer is likely to be more familiar with materials, machines, and structures and their cost and value than the lawyer or accountant, but is usually less accustomed to function in a systematic channel of procedure or to be interested in the reasons therefor. Commercial and business practice rather expects and requires this formality, with the result that the engineer usually finds himself serving subordinate to a lawyer or accountant. It is believed that this is neither necessary nor beneficial, and that an engineer might without professional detriment act in the full capacity.

The British system is rather weighted down with technicalities of a legal and an accounting character which are detrimental to rapid and equitable settlements. This appears to be due to the overpredominance of the lawyer and accountant in the development of the British procedure. Had the British engineering societies taken this matter in hand, as there is now the opportunity for the American national engineering societies to do, a simpler, more direct, rapid, and equitable type of procedure might, through custom, have come into use.

Accounting versus Engineering Methods in Appraisal Work

An illustration of the functioning of the legal type of mind and the accountant type of mind in appraisal work is shown in the photograph reproduced in Fig. 1, which pictures an appraisal in which nothing loose escaped being tagged. A spare screw the size of an anise seed was put in an envelope and two tags filled

Fig. 1 Complex Method of Inventorying, Where an Individual Tag is Placed on Every Article

out in detail and attached; it was then inventoried and appraised by two men and listed and carried forward as a separate item. In the case of a set of ten small stamping or numbering punches in a wooden box, a tag was made out for each number and one for the box. Every one of the three dozen clamps shown on top of the shelf at the right of Fig. 1 had its own individual tag and appraisal valuation, signed and certified to by the initials of two men. Every jot and tittle of the law was carried out. Thirty thousand tags were printed to appraise this one plant and were but half enough.

In this plant every machine was stripped to the casting, chucks, spindles, collets, tool rests, and holders being taken off the lathes and tool centers, dividing heads and table equipment removed from the milling machines; in fact, all operative parts were taken off, collected, put in groups of a kind in another building, checked and listed. That it was neither possible readily to put this machinery back into production nor to show a prospective purchaser the available parts of the machines or their condition, made no difference; accounting was vindicated and sense sacrificed to system.

Neither of these methods would have been suggested or chosen by an engineer engaged to determine value. No engineer would spend fifty times the cost of a screw in tagging it, nor make out

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thirty-six tags for three dozen identical simple tools in the same condition of wear. Nor would he think of making a collection of all the similar parts in a machine shop, for his sense of value would tell him a machine must be considered as a unit, as a going functioning entity for operation or for sale. It is true that parts are interchangeable, but when adjustments must be made to thousandths of an inch, a considerable loss of time and expense is involved in an indiscriminate shuffle of similar parts.

The topic of appraisal and valuation methods is particularly opportune because of the considerable amount of appraisal and valuation work in connection with the settlement of war contracts and because of the expected growth of American commercial and industrial interests abroad; and the present study of appraisal and valuation methods is offered as a contribution to the subject, with the conviction that valuation is essentially an engineering function, and that it is the duty of the engineer to develop, guide and control method and procedure.

Classification of Appraisals

Procedure and reports must necessarily depend in part on the purpose of the valuation. Appraisals may be classified as follows:

Private Appraisals and Valuations in connection with
- *a* Sale, Rent, Mortgage or Bond Issue
- *b* Absorption or Business Combination
- *c* Reorganization
- *d* Liquidation, Insolvency, Letters Testamentary
- *e* Insurance, Private Damage Claims.

Public Appraisals and Valuations in connection with
- *a* Taxation — federal, state, local; Custom Duties
- *b* Condemnation Procedures, Public Damage Claims
- *c* Regulation of Rates, Charges, Tolls
- *d* Public-Ownership Negotiations
- *e* Alien Property
- *f* Mobilization and Demobilization of War Industry
- *g* Material Disposal.

The method of studying and valuing assets commonly calls for a broad division into
- *a* Tangible or physical, such as real estate, structures, appurtenances, equipment and tools
- *b* Intangible or non-physical, such as organization-effectiveness, experienced management, good-will, franchises, patents, etc.[1]

With so many elements, each with possibilities of variation, it should be realized at once that value is by no means a constant quantity but is, in the nature of the case, fluid and variable.

Determination of Value

Whatever the purpose of an appraisal, the writer would emphasize this fluidity of values, and more especially the continuity of values. One of the chief difficulties of appraisers, appraisal boards and commissions is that they do not keep on the path of value — they stray off, get lost in a fog of terms. They then try to locate themselves by assuming an unreal hypothetical "base," a "rate base" or "taxing base," "return base," "capitalization base," etc. Such a "base" in value is an illusion and a snare. In the nature of the case, base connotes permanence, an absolute fixed reference point. Value as the function of numerous variables is continually changing. The correct method is to follow the changes by studying their cause and reason.

The road of value might be said to begin with cost and end with price. It flows along, up or down, broadening or narrowing perhaps, but it is continuous. The mathematical ideal for tracing any flowing value is Newton's method of fluxions or formulæ of flow. It is not proposed to develop by the calculus an exact formula for fluctuating value, but it is desired to emphasize that the variations in value are continual and are best considered in relation to the causes of which they are a function. As a general method, therefore, the value at any time between cost and selling price may be determined, and is best determined for practical purposes by percentage allowances and adjustments for changing conditions.

Value flows from (actual) cost to (fair selling) price and is a function of numerous variables. It is believed that if the principal economic variables are allowed and adjusted for by percentages, value can be traced and determined at any point desired with reasonable accuracy and a fair market value closely approximated.

The line of flow of value may be pictured graphically as the compound of a number of variables. The three main variables, labor, material and an aleatory factor which covers the general risks of the business with particular reference to marketing, may be plotted separately and then compounded. A composite of these indicates the normal value of an article. The interest return on capital is commonly expected and admitted to be a constant and not a variable factor.

Normal or natural value is therefore determined by cost of production to a considerable extent. Beginning with the simplest

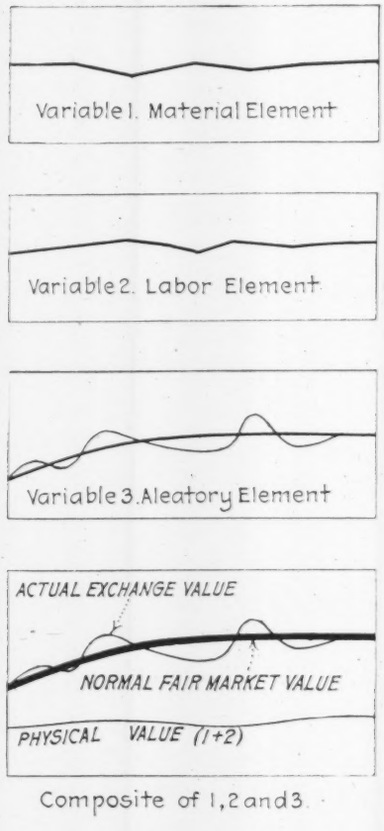

FIG. 2 LINES OF FLOW IN VALUE OF AN ARTICLE

case of value, an article composed of a labor and a material element has a value of the actual cost of the material and the actual cost of the labor including overhead, combined with the aleatory element of market conditions as indicated graphically in Fig. 2. The first two lines indicate the tangible or physical value. The aleatory variable combined with these gives an indication of value in exchange or market value. The heavier line drawn normal or perpendicular to the fluctuations of the latter gives the line of "normal" or "*fair* market value."

Commodity Values

Normal values of freely produced commodities tend to be equal to their expenses of production. Any price which yields a greater or less return is unstable. The law of supply and demand operates to oscillate value above or below normal. But as price is a function of quantity demand, the departures from normal are usually not excessive. Other things remaining constant, the quantity demanded increases as price falls, and conversely, the quantity demanded

[1] Development and promotion expenses, advertising early losses in establishing the business as a going concern, are properly allowed for under this heading.

decreases as price rises. "Demand Schedules," i.e., lists of quantities called for and corresponding prices, are usually available for various commodities. "Supply Schedules" give the response to range of price by indicating offerings at various prices. Variation of quantity demand rests ultimately on the principle of marginal utility. The equilibrium between supply and demand schedules, when reduced to graphs, will be indicated by the intersection of the demand and supply curves. Potential supply affects demand-price value nearly as much as actual supply.

While values of constituent labor and material do fluctuate, the changes are usually slow, late and easily discounted. The element or factor varying the most widely is the aleatory element. However, even this does not depart on the average very largely from a normal value. A line of flow of value over any period would then run about as shown in Fig. 3 for the composite for these three major elements.

Industrial-plant Values

Passing now from a simple commodity to an industrial plant, a similar flow of values from actual cost to selling price holds. That the line is by no means straight is the commonplace of commercial experience. Value goes up or down, oscillating sensitively with broad economic opportunity or depression. The law of supply and demand governs. Naturally utility is a big factor, which is not the case in commodity appraisals. Prospects, the law of diminishing return and that of increasing return are elements in the aleatory factor.

A line of flow of value for an industrial plant is the combination of physical value and aleatory value. If the plant is liquidating, the value is practically all in the physical or tangible value. There is little difficulty in determining physical value as it is largely a matter of honesty of purpose and assiduity.

The Aleatory Element

The determination of the aleatory element is difficult because it is composed of many variables which change from day to day, such as the quality of management, experience, ability, skill of the organization, labor conditions, the general demand and supply of raw material and the demand and for supply of the product. The obvious thing to do is to study and fix the major variable elements by careful investigation, comparison, and study, form a judgment, and value and appraise accordingly.

Manifestly the skill and ability of business men and managers should be directed to holding steady the aleatory elements if they take their responsibility honestly and seriously, but the scandal of business is the advantage taken of such opportunity by corporation officers to advance private interests and their own fortunes.

This is one of the factors that has brought on regulation by public-service or public-utility boards. Speculative fortunes, misnamed "profits," have been unfairly acquired by monopoly or jobbery. It has been proposed and attempted to prevent this and enforce fair dealing by a mechanical fixing of rates, wages and salaries. The result, however, has been that life and enthusiasm were crushed out of management and a legitimate element of going-concern value, in ignorance or in vindictiveness, was destroyed. Naturally, the uniform complaint of such regulation is that it "hits value." The *reductio ad absurdum* of regulation would be to fix all the economic variables which would bring value to a fixed base, a condition of stagnation. The essence of the public service or utility difficulty is not so much a question of valuation as it is of ethical responsibility and criminal prosecution of evil corporate activities.

A true appraisal of the aleatory element in an undertaking of any size is bound to be what is known mathematically as an instantaneous value, a value for the ability and integrity of the men involved and the conditions of the moment. Character, fair dealing, trend of supply and demand, etc., can be allowed for as business assets, but they are in the nature of the case speculative and the value is as instantaneous as a stock quotation. Price as the ultimate test of value proves this by its variations and fluctuations.

A stock quotation is a price estimation of a share in a concern under the pressure of supply and demand for the share. It does not indicate, except vaguely, the value of the whole, but may, if full information is available, give the trend of the estimation of the speculative variable. A comparative range of stock quotations is useful but not conclusive.

In connection with the appraisal of war industrial plants which in many cases were going out of business or liquidating, leaving for appraisal merely the physical value and a small speculative opportunity, this matter was thrown into sharp relief. The importance of the elements of organization, management, supply and demand for raw material and products as factors in market value were strikingly evident. At least 50 per cent of the value of a producing concern is in these elements and value will rise or fall as they vary.

Problems of Demobilization of War Industrial Plants

On the signing of the armistice on November 11, 1918, our country faced two big problems:

a The demobilization of the war personnel

b The demobilization of the war material, or the demobilization of the war industrial plants.

In connection with the demobilization and readjustment of war industrial plants to peace service, the writer, as District Appraisal Officer, Finance Division, Bureau of Aircraft Production, New York District, faced the problem of obtaining rapidly appraisal

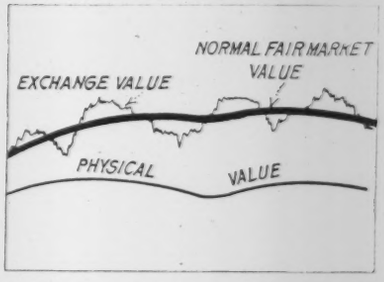

Fig. 3 Lines of Flow in Value of a Plant

valuations for a great mass of war utilities varying all the way from isolated lots of chemicals, coal, textiles or containers to entire industrial plants.

The industrial plants were in some cases "taken over"; in others they had been built entirely *de novo* for war service; while in still other cases they were assembled out of heterogeneous existing buildings, adapted or enlarged to meet the emergency. While some of the latter were entirely completed and went into production, the armistice found some but three-fourths done and which had never gone into production at all. The problem presented itself, therefore, of determining equitable valuations rapidly for the settlement of claims and the restoration of the industrial life of the country to peace channels promptly and without economic shock.

A considerable force of appraisal engineers or appraisal experts was assembled and organized for this special work and a number of engineers were at once assigned to collect, tabulate, and systematize all available data and statistics on prices and wages, and finally to bring the data down to readily usable shape in the form of tabulations, charts and graphs.

This was done for the various materials, such as chemicals, metals, textiles, paints, coal, etc. Also for the usual structural materials of engineering and for machinery. As an exhibit of method, several such charts or graphs for building materials and wages are given in the complete paper. Such information indicating the current variation in values is the first requisite in the equipment of an appraisal office.

At the same time an endeavor was made to gage the future and forecast prices by a study of the trend of the markets and the

economic factors affecting them. No sudden decided general slump in prices or wages was observed in the first six months after the armistice; probably for the reason that demobilization was in general carefully and judiciously managed and also because the normal production in many lines of activity had been interrupted or suspended and was below the demand.

With reference to statistics as a basis for valuation, the general run of unchecked statistics are probably not of great reliability. Indeed, all statistics not tested or checked back to the daily market quotations for material, and to daily wage rates or payrolls for labor, should be used with caution. This applies with equal force to Government statistics. The imprimatur of a Government seal lends often a fictitious importance which may or may not be sustained by checking against hard facts. The empire that depended most on statistics during the war in formulating policies in vital matters, time and time again found its painstakingly classified "reports" unreliable and came to one foolish decision after another. The changing personnel of bureaus subject to politics is

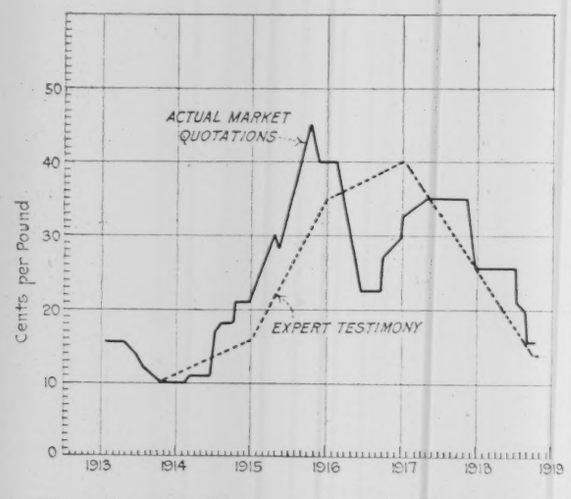

FIG. 4 CHART SHOWING COMPARISON BETWEEN MARKET QUOTATIONS AND EXPERT TESTIMONY ON PAST PRICES OF AN IMPORTANT WAR CHEMICAL

more than likely to be casual and careless in work steadily calling for the highest accuracy and faithfulness to fact.

IMPORTANCE OF DAILY MARKET QUOTATIONS

As for expert testimony on past prices, the experience of the writer in checking such testimony given before a Government appraisal board on which he represented the United States, against the actual daily market prices of a certain indispensable and important war chemical, is shown in Fig. 4. When the facts of market value are a matter of daily record at first hand, it is well to have recourse to them rather than to expert testimony.

Curves and graphs, however, must be plotted and used with sense, for daily market values tend to indicate the extremes of prices, much as a differential thermometer indicates extremes of temperature. It is manifestly inaccurate to judge the temperature of a day by the extremes indicated for a moment by a differential thermometer at, say 1 a.m. and 2 p.m. The limit of variation is defined, and division and allocation will give an accurate average value.

With reference to method of determining fundamental values, therefore, recourse should be had to actual daily market quotations and payrolls rather than to testimony, compilations or unchecked statistics. The facts should be obtained in each instance, and obtained at first hand.

DEFINITIONS OF APPRAISAL TERMS

The terms commonly used in appraisal work should be defined explicitly for the sake of uniformity and clearness in both field operations and in office reports. A memorandum of definitions developed by the writer and used for such purpose in U. S. Government work is given below.

MEMORANDUM FOR APPRAISAL EXPERTS BY DISTRICT APPRAISAL OFFICER

1 An appraisal is a valuation by an authorized person, of definite date. It is a mature, studied judgment, not merely an opinion.

2 A valuation is an estimation of worth, the act of setting a price after mature consideration.

3 Price is the money equivalent for which an article can be exchanged in a current market.

4 Appraisal is therefore the estimation of money equivalent or exchange value in the current market made by an authorized person at a definite time and place.

5 It is only valuation in exchange, and *not utility*, which is, in general, of interest to the appraiser.

6 Careful distinction must be drawn between cost and present value; cost is essentially a past price or value, market value is related to present price.

7 There is no constant uniform relation between a past cost price and a present value price, but the first is useful in arriving at a fair, reasonable estimation of the second, and should be obtained as a basis of departure.

8 In general, an investment should at all times remain unimpaired and this is provided for in larger matters by "amortization," i. e., by an allowance against the gradual dying of a tool, equipment or entire plant, or capital.

9 Amortization is provision for the recovery or the conservation of capital. The principle of the conservation of capital is in the public interest. It is to the effect that the cost of a tool or plant is a proper charge on production pro rata, that a workman or working concern should not use up its tools without an allowance to recover or replace them, and indeed cannot do so, survive and serve.

10 Physical depreciation is the decrease in worth, due to wear, tear, and use. It is the percentage *used* up.

11 Physical amortization is the percentage of value extinguished or "charged off" by reason of decrease in effectiveness, or serviceability for production. It is the shrinkage of value by reason of age or passage of time.

12 Appreciation is increase in value due to economic causes.

13 Scrap value is the value as old material or the fair market price after deducting the cost of removal — perhaps 10 per cent of cost.

14 Salvage valuation in contradistinction to scrap value means the value below which an item will not be depreciated as a going, functioning article or machine — perhaps 25 per cent of original or reproduction cost.

15 In making a valuation of an industrial property account may properly be taken of:

a Original actual costs and year of purchase
b Probable remaining life or usefulness, item by item
c Obsolescence and percentage of inserviceability for efficient production
d Present average market price and conditions
e Any annual write-off made in accounting.

These to be used as a basis of an appraisal, i. e., an estimation of money equivalent at going prices in the current market, singly, and finally as an entity at a definite time and place.

16 A "Fair Value" is that which fair and reasonable men would say ought to be attached to a property under all the circumstances of a particular case; it is an estimation of what under all the facts and circumstances of the case is a just and equitable amount.

17 Fair Market Value is an estimation of the reasonable value obtainable by a prudent, solvent seller from a prudent, willing buyer, both under the necessity of making an exchange in a reasonably brief period of time. It is not immediate-forced-sale or auction-sacrifice-sale value.

18 Fair Market Value is for all practical purposes the actual cost less the physical depreciation or *used-up* percentage, less the physical amortization or a *shrinkage* percentage of decrease in effectiveness for service, with an adjustment to transfer this value to market value.

19 Physical Value: Actual cost less physical depreciation less physical amortization. Fair Market Value: Actual cost less physical depreciation less physical amortization, with an adjustment to present market conditions; or

20 P.V. = A.C. - P.D. - P.Am.
F.M.V. = A.C. - P.D. - P.Am. - M.Adj.

21 Fundamental Diagram (Normal) (Fig. 5)

22 Fundamental Diagram (War) (Fig. 6)

As the basis of any appraisal of physical assets for any one of the twelve kinds of appraisals mentioned in an earlier paragraph, a listing or inventory is necessary. In the appraisal of small lots

of supplies the process is simple. Accuracy in enumeration and in giving a brief identification description is what is required.

Percentage Method of Plant Appraisal

In the case of the appraisal of an entire plant, however, some systematic method must be devised and strictly adhered to. In general, the plan of attack will be to divide the inventory work into sections as follows:

a Buildings and appurtenances
b Raw materials and supplies or stock
c Goods in process
d Finished products.

Sections *b*, *c* and *d* as a rule call for a straight commercial inventory or stock taking and present no unusual difficulties. Any convenient system of listing and checking that prevents duplication or omission will serve. Section *a*, however, which usually comprises a large percentage of the value, calls for the best skill of the engineer, and is therefore usually handled under sub-classes or symbols. A scheme of symbols and sub-classes that was found serviceable in War Department work is given in the complete paper.

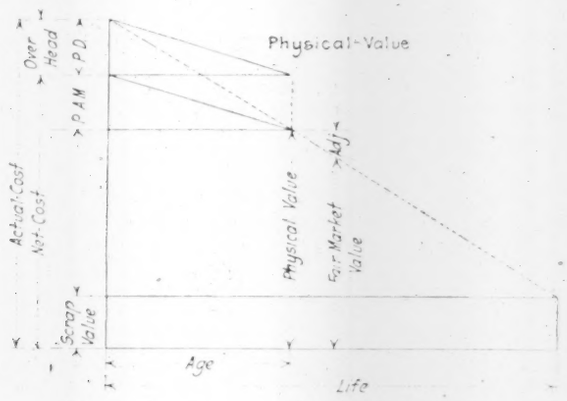

Fig. 5 Fundamental Diagram (Normal)

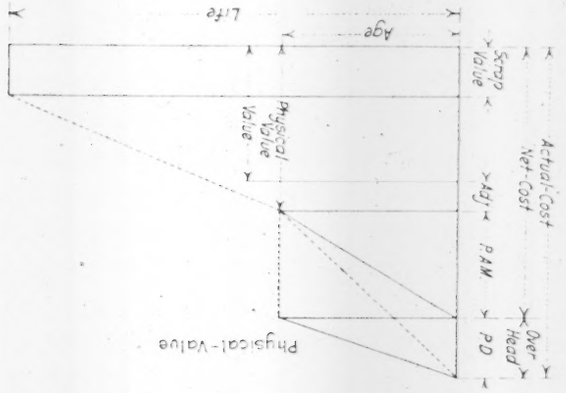

Fig. 6 Fundamental Diagram (War)

When a plant is to be liquidated and sold either by item or as a unit, it is sometimes desirable in inventorying to leave a numbered tag of identification on the article and to take a carbon copy for listing by symbol on the appraisal sheets. Any permanent identification number stamped on the article or machine should be given as a check in the disposal of the material.

The value of any item as a separate, isolated article may well be different from that for the article considered as a part of an entire functioning plant. Therefore appraisal values set upon tags at the time of tagging must, after being listed by symbol, be reviewed both as a check and as an adjustment to the department or plant as a unit. Judgment and experience must be the guide in these matters.

As a check upon this and as a means of very rapid approximate appraisal, a set of sheets adapted to the formula 20 given in the preceding memorandum were devised with six columns, namely,

1 Physical Depreciation
2 Physical Amortization
3 The Sum of 1 and 2, or the Write-Off
4 The Balance of Value
5 The Market Adjustment
6 The Fair Market Value.

The arrangement of one of these sheets is shown in the complete paper.

If either the approximate cost of the segregation under the symbol or its percentage of the total cost is known, it is then possible by allocation to determine a value and an estimated fair market value for an entire department, or for an entire plant. It should be remembered that an appraisal is not as a rule an outright sale or settlement, but is an estimation and calculation, or a judgment, as a basis for action.

The sub-divisions under the symbols will be numerous and the individual items almost infinite in number; therefore handling an appraisal by itemizing and appraising each individual article, item by item, is long, tedious, and expensive.

The entire matter can, however, be handled on a percentage basis quite rapidly if actual costs are known or determined. If the percentage of physical depreciation by group or even by article is carefully determined and fixed, and the group or article given its proper relative "weight" or approximate percentage-cost importance, it is possible quickly to integrate article physical-depreciation by allocation to group physical-depreciation, and then integrate to sub-symbol and finally to find a value for physical depreciation by symbol and finally for the entire plant.

By this method it is believed that the small errors average, or balance out, disappearing in the successive integrations much as second differentials do in calculus.

Advantage of the Percentage Method

As depreciation and amortization are after all a matter of ratio or percentage, the dollar sign need not appear anywhere in the process of appraisal except at the beginning in the determination of relative weight and at the end in determining fair market value in money.

An additional advantage is believed to be that this method concentrates attention on relativity of value rather than on actual prices, mention of which leads to endless detail discussion and lost motion, and distracts attention from the end to be achieved. The only way in which the ultimate object and purpose can be kept constantly in view is by using weighted percentages and integrating. Experience indicated that the effect of discussing individual money prices was to differentiate rather than to integrate valuation.

Column 5 need not be carried out for each symbol, as it is more than likely that the adjustment for the speculative factor will be practically uniform for an entire symbol, or even for an entire plant. This adjustment percentage must be carefully studied so as to allow for any variable factors favorable or unfavorable, which appreciably affect or enter into value. They should be determined separately by comparison with all available data and given their proper weight in the final integration.

As a check on the more laborious detailed method of appraisal by itemized priced inventory, or as a rapid appraisal where time is a vital factor, it is believed that this method has the advantage of constantly viewing the process as a whole; also the additional advantage that the errors due to its approximations are averaged out by integration and are less than the inevitable errors in the close, near-sighted, detail-price appraisal. Therefore it is not only more expeditious but also more accurate.

The flexibility under rapidly changing markets is apparent. By this method an appraisal by percentage of a large war plant was finished and reported on in ten days. An appraisal on the individual item tag system had been going on for months, with no prospect of its being completed in a year or being in any close connection with prevailing prices at the time of completion of the appraisal, in spite of the amount of time and money expended upon it.

In this percentage method the basis on which the percentage is to be taken must be most carefully checked and determined. The advantages of actual cost, taken in this method as the basis, are believed to be as follows: Actual cost is (1) a past value; it is (2) a definite, absolute figure; it can be (3) closely approximated even if not a matter of record; it can be (4) more accurately determined by reference to records of past material quotations, wages, and payrolls than any other possible "base"; it is (5) logical to adjust this past value to present value, and (6) in doing so the trend of value is necessarily brought under consideration. In connection with war contracts, whether fixed-sum of cost-plus, the actual cost was usually available.

Table 1 shows an allocation of physical depreciation by symbol

TABLE 1 TYPICAL TABULATION OF ALLOCATION BY SYMBOL OF PHYSICAL DEPRECIATION

Symbol	Percentage of Total Actual Cost. (P)	Depreciation by Symbol. (D)	$P \times D$
1	(Land constant value	by contract)	.....
2	62.97	10.25	646.0
3	7.74	19.83	153.0
4	1.81	13.00	23.6
5	3.56	10.00	35.6
6	4.59	15.00	69.0
7	0.11	40.00	4.4
8	1.52	24.70	37.0
9	2.84	20.00	57.0
10	5.99	20.50	123.0
11	0.19	12.00	2.2
12	2.18	13.60	30.0
13	0.22	25.00	6.2
14	2.20	16.00	35.2
15	(Drawings)	0	.....
16	0.18	90.00	16.2
17	3.78	58.80	222.0
18	0.12	80.00	9.6
		(Average = 14.70)	1470.0

built up from integration of the sub-symbols. In an exactly similar manner the physical amortization can be tabulated and determined.

Divisions of the Speculative Factor

Exact agreement by an appraisal board, without arbitration, has been achieved on physical valuation by this percentage method. The speculative factor is the one on which differences largely occur, but the method has the advantage of concentrating and confining discussion to that topic. This factor may be considered broadly under two headings:

a Going-concern speculative factor
b Liquidation speculative factor.

Under heading *a* the elements contributing value are:

1 Effectiveness of organization
2 Experienced management
3 Good-will, sound advertised reputation
4 Standard product, standard service
5 Patents, franchises, etc.
6 Sound business policy; financial (credit) strength and connection.

These intangibles must be rated by their past and prospective performances, by comparison with similar cases, and judgment taken. In a sense they represent common-stock capital, as against the preferred-stock capital of the physical values, and must be judged by results achieved or reasonably to be expected. In the nature of the case they are speculative and not subject to exact definition. The test is neither so-called "efficiency" nor even production. It is the maintenance and prospective improvement of an evenly balanced, healthy, profitable business life.

A rating or appraisal of this element calls for the most intelligent and careful conservative study of the main elements listed above, and an honest judgment on them individually, and finally as a whole. The capitalizing of these elements on the basis of dividend returns or profit is not a proper procedure, unless it is clearly indicated as a common stock capital or marked clearly as an instantaneous valuation of the conditions of the date which is given. The Supreme Court of Maine has gone on record to the effect that "the capitalization of income even at reasonable rates cannot be adopted as a sufficient or satisfactory test of value."

The Prevention of Value Fluctuation

The necessity of the hour is a balance wheel to business that will decrease the speculative element and prevent wide or violent fluctuations of value. During the past two years there has been a world-wide advance in prices. This is due rather to a fall in the value of gold, or money, rather than to a simultaneous rise in the value of everything else. One very practical suggestion to steady business is the plan of Prof. Irving Fisher, of Yale, for stabilizing the dollar in purchasing power. He says: "With each change in the purchasing power of money (in other words, with each change in the price level) some people lose what properly belongs to them and others gain what does not properly belong to them. Our sense of 'social justice' is offended." These fluctuations cheat the small savings-bank depositor as well as the wealthier bondholder, conduce to social unrest, distrust, and discontent, and produce industrial instability and crises. In a word, they make fair dealing in the conduct of business difficult for those of good intent, and enable those who study values as a pure speculation or gamble to profit without production.

Even the conservative must unwillingly, even unconsciously, become involved when our unit of measuring values shifts 50 per cent in a few years and constantly varies. To capitalize income to a rate base under these circumstances is unreasonable, unfair, and unjust.

The remedy of legal regulation or restriction aggravates matters by working against effectiveness of organization and against good management by removing the incentive. Price and rate fixing are less important than value and dollar fixing. The former seem in practice to operate on some minds to decrease the importance or even eliminate necessity of good-will. Indeed, the statement has been made in a court of law that under monopoly there is no "good-will." Government control and regulation are a species of monopoly and do not foster good-will. A decline in good-will results in a lower appraisal valuation.

Patents and franchises (if not in perpetuity) have a value which is limited by the life of the patent and the circumstances. These matters are speculative and must be appraised accordingly. They are best considered as individual elements, given their proper weighted importance and integrated as physical value can be integrated.

The Final Value

The combination of the integration of physical value and integration of speculative values gives a final value which should check against capitalized interest or dividend return in the light of all the circumstances of the case. In this way a value may be obtained which is a real basis for production profits and dividends, which will also justify unusual dividends on the basis of efficient organization and management. Let it be said that there should be no objection or complaint against large dividends or profits if large and efficient service has been rendered. The sooner this idea is accepted, the better for every one.

With reference to the procedure in the appraisals for various purposes classified earlier in the paper, the general methods indicated will naturally be varied in detail and emphasis laid according to the special requirements, and the report will stress and elaborate circumstances accordingly. Supply and demand schedules would naturally be of importance in an appraisal for absorption or combination, but of little moment in a matter of liquidation. In material disposal they would be vital, but in a taxation appraisal of much less moment; the exigencies of the case will vary the methods and procedure outlined in the paper.

There will shortly be under the American flag 1731 oil-burning steamers, nearly 10,000,000 deadweight tons. Fuel stations are being established so that these ships may make a world circuit without fueling at other than American-owned stations.

Investigation of Strains in Rolling of Metal

By ALFRED MUSSO,[1] NEW YORK, N. Y.

This paper is a discussion of one of the most important problems incidental to rolling-mill operation. In such mills, while raw stock is being transformed, a certain amount of material is wasted, and to determine the factors involved in this waste, the author asks and answers this question: "What is the most convenient length and width of the piece of metal to be rolled in order to produce a finished article of certain definite dimensions so that the waste of material may be reduced to a minimum?" The answer, which forms the body of the paper, is based on data secured as a result of actual investigation.

WHEN a piece of metal is put through the rolls in a rolling mill, its linear dimensions are strained and the whole piece itself is deformed; in other words, the thickness of the piece becomes smaller while its length and width are increased. These strains are the effect of the pressure which the rolls exert on the piece, and as introductory to our specific subject we will first consider the behavior of a piece of metal under compression.

Let $ABCD$ (Fig. 1) be the cross-section of a piece of metal as subjected to the pressures P and P_1 normal to the faces shown in cross-section as AB and CD. When the compression is carried beyond the elastic limit of the material, the two faces AB and CD

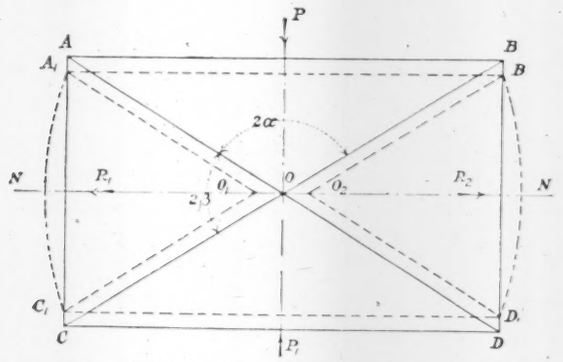

FIG. 1 CROSS-SECTION OF A PIECE OF METAL SUBJECTED TO PRESSURES P AND P_1

will come closer together as shown by the dotted lines A_1B_1 and C_1D_1, while the two sides faces AC and BD will bulge outward as shown by the dotted curved lines A_1C_1 and B_1D_1, and if the forces P and P_1 are still increased the piece will ultimately fail by shearing along its diagonals.

The ultimate behavior of the failing piece is influenced by the structure of the metal itself. In fact, experience shows that ductile metals possessing a homogeneous structure, such as copper, aluminum, etc., will become plastic and flatten down to a disk, while fibrous metals, such as steel, wrought iron, etc., where strength across the grain is much lower than with the grain, are not susceptible of any plastic state at all and will ultimately fail by splitting sideways. As it is beyond our present scope, however, to discuss this subject of the failure of metals under compression, it is sufficient for our purpose to regard the piece as shown by Fig. 1 as divided into six pyramids having as a common vertex its pressure center O, and as bases its six faces.

It is obvious that while the compressive forces P and P_1 are tending to telescope into each other along the pressure line PP_1 of the upper and the lower pyramids, the other four pyramids will be pushed outside by the expulsive forces R_1 and R_2 consequently set up by the aforesaid pressures P and P_1. The value of the expulsive forces evidently depends on the two angles AOB and AOC, ordinarily known as *pressure angle* and *expulsion angle*, respectively. We will now apply the foregoing considerations to the rolling-mill process, and begin our investigation of the effects of the roll pressure at any point of the surface of the piece being rolled.

Let Fig. 2 represent a cross-section of a rolling mill through the rolls. NN_1 is the piece of metal going through the rolls C and C_1. Inasmuch as the pressure is exerted radially we may consider it at any point, say at A, which is the initial point of the contact arc AMB. The pressure P may be resolved into two components, one normal to the piece and the other parallel to its surface, as follows:

$$n = P \cos b, \text{ normal component}$$
$$m = P \sin b, \text{ parallel component}$$

where b = angle ACB, known as the *approach angle*. The direc-

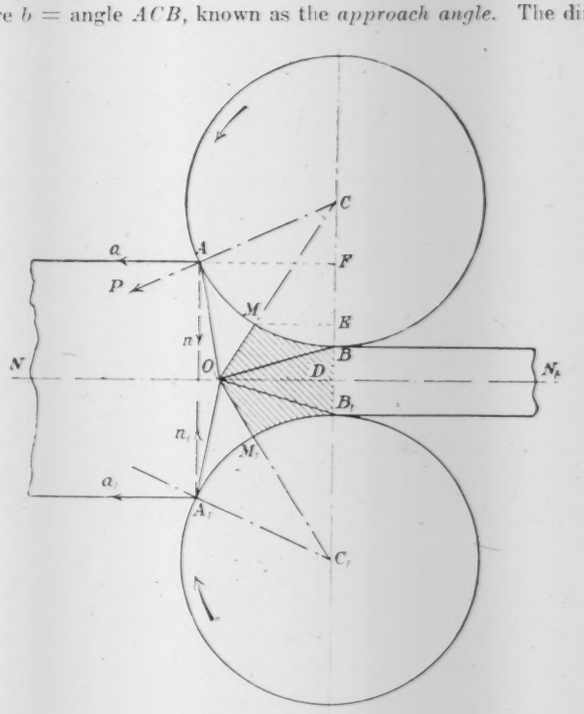

FIG. 2 CROSS-SECTION OF A ROLLING MILL THROUGH THE ROLLS AND PIECE OF METAL BEING ROLLED

tions of the components clearly show that while n is the force which actually compresses the piece, m is the component of the pressure which hinders the piece from entering the rolls, and unless n is larger than m, the rolls will not grip the piece.

The useful limit of b is easily found from the relation $n > m$, from which $b < 45$ deg. The actual value of b for metals is given by $\tan b = c$, the coefficient of friction between roll and piece, but for metals $c = 0.577$ (approx.), therefore $b = \tan^{-1} 0.577 = 30$ deg., which, according to actual practice, is the maximum value of the approach angle for which the rolls will grip the piece.

Let us now deal with the effect of the pressure on the whole arc of contact AB. We may consider the pressure as applied to the middle point M and the whole piece represented in cross-section by ABB_1A_1 will be divided into pressure pyramids with a common vertex at O. In accordance with previous remarks concerning the behavior of a piece under compression, we deduce that the part of the piece bounded by the contact ares and shown shaded in the figure is pushed outward by the rolls in the direction of the pass, consequently it is the one we must consider in looking for the elonga-

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tion of the piece. Obviously, when the piece has gone through the rolls, the shaded area $OMBB_1M_1$ will have been transformed into a rectangle, its height being equal to the pass and its base longer than the average base of the original expelled part.

Determination of Elongation. In the complete paper an expression is derived for the shaded area $OMBB_1M_1$, which, as previously noted, must be equal to the area of a rectangle of height b and base of length l, where p = pass (BB_1). The value of l is given by the equation:

$$l = \frac{1}{p}\left(\frac{(2r+p)^2(t-p)}{8r\sin b} - \frac{3.14r^2}{360}b\right) \quad \ldots\ldots\ldots [1]$$

and the value of the average base l_0 of the shaded area by

$$l_0 = \tfrac{1}{2}\left(\frac{(2r+p)\ (t-p)}{4r\sin b} + r\sin\frac{b}{2}\right) \quad \ldots\ldots\ldots [2]$$

in which r is the radius of the roll and t the original thickness of the piece (AA_1).

The elongation e of the piece will evidently be $l - l_0$, and referring e thus found to the total length of the piece gripped by the rolls, we will have the elongation per unit length e_1. Also, the total

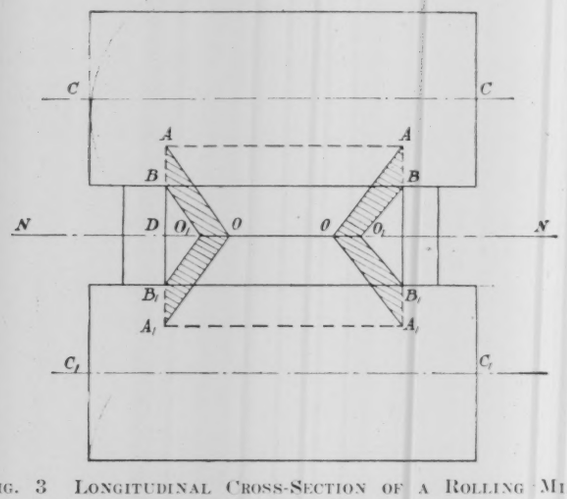

FIG. 3 LONGITUDINAL CROSS-SECTION OF A ROLLING MILL THROUGH THE ROLLS

length of the piece gripped by the rolls is (Fig. 2) $AF = r\sin b$, whence the percentage elongation e_2 will be

$$e_2 = \frac{100\,e}{r\sin b} \quad \ldots\ldots\ldots [3]$$

Equation [3], besides showing the elongation obtained by rolling a piece of metal, furnishes also other valuable information, namely, a check on the safety of the rolling operation, by comparing the e_2 with the tensile-strength test of the material in question. In the event that the value of e_2 is too large for safely straining the piece, or should it happen to be too conservative, it will always be possible to readjust the pass of the rolling mill to suit, because e is a function of b.

In order to find the side spread (s) of the piece caused by the roll pressure, we will refer to Fig. 3, which is a longitudinal cross-section through the rolls. Let CC and C_1C_1 be the axes of the rolls, $AA_1 = t$ the original thickness of the piece and $BB_1 = p$ the pass. In this case, since the expulsion angles AOA_1 are equal for both sides of the piece, the total spread will be twice the spread of one side.

By reasoning the same as in the case of Fig. 1, we can easily see the amount of side spread is given by the shaded areas, namely, AOA_1 and B_1O_1B. In this case the shaded area is given by the difference of the areas of the triangles AOA_1 and BO_1B_1, which depend upon the value of the pressure angle a because angle $DAO = a/2$. In the complete paper it is shown that

$$\frac{a}{2} = \tan^{-1}\left[\frac{(r+\frac{p}{2})\tan\frac{b}{2}}{\frac{p}{2}}\right] - \frac{b}{2} \quad \ldots\ldots\ldots [4]$$

It should be noted that the pressure angle is also a function of the approach angle b, and once the value of the pressure angle has been calculated it is easy to find (Fig. 3) the area of the shaded portion, which divided by the pass will give the amount of the side spread at each side of the piece, namely,

$$s = \frac{(t^2 - p^2)}{p}\tan\frac{a}{2} \quad \ldots\ldots\ldots [5]$$

If w is the width of the piece, the total spread per unit of width will be $2s_1 = 2s/w$, and the percentage spread

$$2s_2 = \frac{200\,s}{w} \quad \ldots\ldots\ldots [6]$$

Equation [6] shows that the side spread is independent of the width of the piece, but it depends entirely on the values of the original thickness t and the pass p.

In conclusion the author wishes to present a practical application of the foregoing formulæ by solving the following problem: In the cold-rolling operation a strip of 0.20 per cent carbon steel is put through a 10-in. mill. The strip before rolling is 2 in. wide and 0.065 in. thick. The pass is 0.050 in. Find the percentage elongation and side spread.

The first step is to find the approach angle. The fundamental equation of a rolling mill is

$$t = p + 2r\ (1 - \cos b)$$

Substituting and solving, it is found that $b = 3$ deg. 8 min.. Also, from the above data and Equation [4], $a/2 = 78$ deg. 7 min.

We can now dispose our data as follows:

Roll radius, $r = 5$ in.
Original thickness, $t = 0.065$ in.
Pass, $p = 0.050$ in.
Width of strip, $w = 2$ in.
Approach, $b = 3$ deg. 8 min. $= 3.133$ deg.
$\sin b = 0.05466$
$\cos b = 0.9985$
$\sin\frac{b}{2} = 0.02734$
$\tan\frac{a}{2} = 4.75219$

The elongation, using Equations [1], [2] and [3] is found to be 0.06275 in., or in percentage, $e_2 = \frac{6.275}{5 \times 0.05466} = 24.6$ per cent of the original length of the piece gripped by the rolls.

The side spread on either side, from Equation [5] is $s = 0.164$ in., and the percentage spread from Equation [6] is 16.4 per cent.

The result thus obtained evidently shows that the percentage spread is inversely proportional to w, the width of the piece. Now, because of the fact that in rolling-mill practice we are interested only in obtaining the highest possible value of the elongation e, the best economic operative conditions will be furthered by using a strip as wide as possible consistent with the dimensions of the rolls, the power of the mill and above all the degree of uniformity desired in the thickness of the finished strip.

Wage Payment

By A. L. DeLEEUW,[1] NEW YORK, N. Y.

This paper discusses the various items entering into the present relations between employer and employee. The author first calls attention to some of the terms which are most commonly used but of which there is no clear understanding of their meaning. Among these are "capital, labor, right to organize, collective bargaining and wage." He discusses each of these and then takes up the subject of the various systems of payment in existence at the present time. These are straight wages, piece-work system, various systems of bonus payment, premium payment, and combinations of these systems. In conclusion he states that in his opinion the real cause of the present-day unrest lies in the fact that the wage system now in use is not based on knowledge and justice, but only on guesswork and on the fear felt by both employer and employee that the one may "do" the other.

UNREST among the laboring classes has taken on such proportions and is so widespread that it is timely to discuss the various items which enter into the present relations between employer and employee. Many times one or both parties in the conflict try to befuddle the third party, the general public, by statements which are misleading or which are couched in such words as will hide that which is not true. It is well recognized that where two parties have a difference of opinion the first step should be to find some common ground from which to start, and that then the second step should be to define clearly and precisely the chief terms which enter into the controversy. We read practically every day about war between "capital" and "labor," about the demand of the laboring man for the "right to organize," and of his right to insist on "collective bargaining," and yet these three terms, which are perhaps used in every controversy that comes up, are not only not defined but they are actually misleading in themselves.

If war between capital and labor means anything at all, it must mean war between capitalists and laboring men. Capital is the result of past labor used progressively. Without capital, civilization is unthinkable. Capital is the tool with which the laboring man works. There can no more be war between labor and capital than between the laboring man and his tools. There are a large number of people who actually believe and act upon the idea that capital must be destroyed in order to give the laboring man his own. The fault lies with the capitalists or to the present system of control of capital, not with *capital itself*.

In late years the control of capital has been more and more centralized, or, in other words, in the hands of fewer individuals. And though it is well recognized that this condition has its advantages in many ways, yet the dangers to which such centralized control may well lead have caused it to be regarded with suspicion and enmity. Capital being the tool with which labor must work, it is but natural that labor should look with suspicion on an attempt to corner the tool supply. For this reason we may naturally expect that labor will insist upon a better control of their tools, namely, capital.

It has been pointed out many times recently that there are really three parties, not considering the general public, which have a right to be heard in this controversy, namely, capital, labor and management. It seems to the author that this merely leads to complication without any compensating features. Management and labor are both labor, but of different kinds. If at times they clash, it is not due to unavoidable conditions, but merely to defects in one or the other.

Another term quite familiar to all of us is the "right to organize." The writer does not believe that there is an appreciable percentage of employers who would deny their employees the right to organize; for instance, for a baseball team, or a brass band, or sick benefits. On the other hand, nobody would blame the employers for denying their employees the right to organize for the purpose of burning down the plant, or sabotage in the shops, or blowing up the works of his competitors — however beneficial this might be to him in a business way, or for many other purposes. It follows, then, that the "right to organize" must be further defined or at least limited in its scope before we can judge as to the real right of the employee to organize. If the purpose for which the employee wishes to organize is legal and proper, the third party, the general public, will naturally concede this right, and quite as naturally inquire as to whether the employer has really denied this right to his employee.

The facts in most cases where this right to organize has been brought to the foreground, are these: A labor organization, acting within its rights, succeeds in gathering into its union part of the employees of a certain establishment. The employer, fearing that this activity may lead to a strike, attempts to keep the other employees from joining the union; in other words, he tries to organize them with him, instead of with the union. He also acts within his rights and cannot be said to have denied his employees the right to organize. It is doubtful whether in late years there have been many cases where the employer has denied the employee the right to join the union, even if he was not in favor if it. When undesirable conditions or relations existed between employer and employee, or perhaps when union activities led to a strike, it was quite customary to make a demand on the part of the men for the right to organize, — yet this right had seldom been denied; but, put in this way, the general public would get the impression that all kinds of organizations of the employee are taboo. What is really meant by the "right to organize" is that the employer shall give, not to *his men*, but to *some labor union*, the right to come into his shop and organize his men into a union; which is very different from the idea which the expression "the right to organize" conveys.

Another term which is misleading, even more so than those mentioned before, is "collective bargaining." In collective bargaining it is supposed that some or all of the employees have delegated the right to bargain for them to some attorney or business agent. In practically all cases this business agent is their union, and this union is, according to the term used, supposed to bargain with the employer. As a matter of fact, however, there is no bargaining, and, under the present conditions, there can be no bargaining. There have been cases where the men were entitled to all they asked for, and possibly more; there have been cases where the men were not entitled to as much as they asked for, but the method of bargaining has never been employed, and, in the writer's opinion, *could not* have been employed, to settle the differences, because the essential feature of bargaining, which is a process of readjustment of the value of the object of barter in the minds of the two parties concerned, is lacking. The issue has been brought to a conclusion by strikes, or threats of strikes, which is no more a method of bargaining than when a man points a gun at his debtor in order to collect a bill.

In order that there shall be true bargaining, there must be an object to be sold, an object to be given in barter therefor, and an attempt of buyer and seller to modify each other's conception as to the value of what they are offering. In offering labor and demanding money we have no measure nor can we estimate its value by personal observation, as we can in purchasing a house, except after the labor is done, which is long after the so-called bargaining took place, long after the price was set. It is true that labor is sold by the hour, but the hour is a measure of time, not of labor.

At the present time labor is not sold by measure, but a workman sells his time. *This inability to strike a bargain because the value of the product to be sold is entirely unknown, is, in the writer's*

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opinion, one of the greatest difficulties to be overcome before there can be an equitable adjustment of the differences between employer and employee. The fact that labor is sold by the hour is equally unjust to both parties. Sometimes the employer suffers, sometimes the employee. In all cases it is a source of curtailment of production, and this leads at once to a discussion of wage system.

"Wage" is defined as remuneration for work done, and also as remuneration for time given. The second definition seems to be defective. In the first place, when money is paid for time given, it is called "salary." In the second place, and this objection is more serious, time alone is not bought or paid for. There are many occupations in which the employee must wait until something turns up for him to do, and then he is supposed to do it. Besides time and labor there enters into such cases the requirement of physical presence.

There are cases where, practically speaking, time alone is sold. Such is the case, for instance, with a stationary watchman. Even in such an extreme case something more than time is paid for: the man's watchfulness and faithfulness. In other cases time and labor are paid for: for instance, with a machinist's helper, or a blacksmith's helper. In still other cases time and skill are paid for: for instance, the man running a large planer or boring mill. The writer cannot think of any case where wages or salary are paid for time alone.

In the great majority of cases it is labor that is wanted, or rather the results of labor, and not time. The great prob'em is to find a measure for this labor, in order to obtain an equitable way of paying for it. In even the simplest operations of labor there are so many factors which modify the result that it is difficult to establish a unit of measurement. In some of the more complex work it has been possible to subdivide the operations to such an extent as to set a fixed time for a given operation. But even in the very simple operations some factors enter which will cause troub'e at times — trouble with the machine, breakages, replacement of tools, and the like.

In a large portion of work there is a combination of time, physical presence, labor, skill, knowledge, judgment, and probably other factors which are hard to define, such as re'iability, steadiness, enthusiasm, loyalty, ambition, and whatnot. To make up a formula which would embody all these elements and from which a man's value could be calculated is, of course, impossible. The impossibility of a mathematical solution shows the necessity for the development of a compromise system.

There are various systems of payment in existence at the present day — there are straight wages, piece-work system, various systems of bonus payment, premium payment, and combinations of these systems.

The wage system considers nothing but time and physical presence. A man is selected for a certain task because he or some one else claims that he is fit for that task. If his work is satisfactory he is retained; if not, he is dismissed. Both employer and employee have made a guess. The employee knows exactly what he will get, and guesses at what he will have to deliver. The employer knows exactly what he must deliver, and guesses at what he will get.

With the piece-work system the employer knows exactly what he will get for his money, but the employee makes a guess as to how much he can reasonably do; he has no control over the conditions which will enable him to do, or prevent him from doing, as much as he is expected to.

There are various kinds of bonus systems. The employee may earn his regular wages and get a bonus at stated intervals if his work exceeds the expectations of his employer; or he may be working under the task-and-bonus plan, in which case there is less guessing and more of an attempt at a definite bargain. If the employer is in earnest with such a system, and sees to it that it is possible for the employee to fulfill his task, then this system approaches quite closely to true bargaining.

The premium system is an attempt at gaining the interest of the employee by making him invent improvements in the method of working and sharing the profits with him; but unless the time originally set was carefully studied, and unless all conditions of machinery, tools, existing knowledge, and so on, remain unchanged, this system also will lead to controversies and injustices.

To sum up, the pure wage system is no bargaining in any sense of the word; the piece-work system is only bargaining if employer and employee have reached an agreement, and if there is some mechanism by which this agreement can be changed as soon as conditions change; the pure bonus system is nothing else but a wage system with a kind of profit-sharing plan; the task-and-bonus system, if properly worked out, and if accompanied by complete instructions to the employee, is a perfect bargain, but must be constantly revised as conditions change. However, this system carries with it the necessary mechanism to effect these changes.

Labor unions are fighting organizations, the army with which the laboring man fights the employer. If fighting has given them, if not all, at least a large portion of what they desired, it is but natural that they should consider war the best means of reaching their ends. The unions, so far, have not offered any constructive suggestion, and this cannot be expected from a fighting organization. Furthermore, it is to the personal interest of union leaders to hold to this system. It may be taken for granted that there have been, and are, many unselfish union leaders, but this does not offset the general tendency of the system to perpetuate itself as a fighting organization.

Another reason why the attempt of the employer to put labor on a contract basis has not been well received by the labor unions, lies in the historical fact that on account of occasional scarcity of work it became one of the principles of the union to take measure to insure that whatever work was available should be sufficient to keep the union men in emp'oyment. The three chief means used to accomplish this were: first, to prevent anybody but union men from working at the trade; second, to limit the number of apprentices, or in general, newcomers in the union; third, to limit the output per man. The second item has not been strictly adhered to, because it was found that by limiting the number of men in the union the number of men outside the union was increased, thus decreasing the relative fighting strength of the union. The first item has been strictly adhered to, but has often been denied by the union, probably for the purpose of satisfying public opinion. The third item is still generally adhered to, but is mostly camouflaged.

Taking the aims of organized labor to be:

1 Proper share of the proceeds of labor
2 Reasonable working conditions and working hours
3 Right to organize
4 Collective bargaining,

the writer believes that these aims could all be accomplished without strife if the last item, collective bargaining, were put into actual practice instead of being a mere catchword.

If employers and employees together would put as the first item in their catechism the truth that the world must produce more in order to have more, if employer and employee together would try to find an equitable way of estimating the value of work done, if both would subscribe to the truth that no permanent gain can be made by wearing out a man's capacity for work nor by allowing him to work less than he should for the good of the world at large, if then employers and employees together would organize a Bureau of Research for defining the conditions under which various classes of work should take place, and if, finally, an attempt were made by both employers and employees to classify men according to their natural or acquired ability, there would be very little reason left why a union should be a fighting organization.

Up to the present time the unions have acted entirely through their business agents, who sometimes had, and more often had not, a clear idea of the problems involved in the trade they represented. Whatever knowledge they might have had was not permitted to come to the foreground. It seems to the writer that the time has come for the unions to take the first step along the lines of considering union activities as a legitimate business, and legitimate business cannot shut its eyes to facts, however disagreeab'e to contemplate they may be. It is his belief that the crux of the solution lies in the establishment of a proper wage system, and that in order to establish such a system the engineer must come to the assistance of labor in order to find standards of value for work done. Though it is not likely that there will ever be a time when

(*Continued on page* 976)

COMBUSTION OF HEAVIER FUELS IN CONSTANT-VOLUME-TYPE AND SUPERINDUCTION-TYPE ENGINES

By LEON CAMMEN,[1] NEW YORK, N. Y.

Well-recognized liquid-fuel conditions make it imperative to prepare for the demand for engines capable of running on fuel heavier than gasoline, such as paraffin gas oil and similar products. The cardinal element governing the design of such engines is the rate of combustion of the fuel-air mixture, and since oil-air mixtures have a much lower basic rate of combustion than gasoline, conditions have to be created in the cylinder which will accelerate the combustion. One method of doing this, suggested in the paper, is by the use of superinduction, and an installation is described showing its application, and formulae for power output are deduced. The design of kerosene engines and the carburation of kerosene and similar fuels are discussed in some detail.

THE demand for gasoline is so great that it becomes imperative to look for other fuel supplies, either heavier oils of petroleum base or such fuels as gasoline, benzol, etc. The present paper considers mainly the combustion of kerosene and still heavier fuels in engines of the constant-volume type, that is, engines such as are at present used in motor cars, tractors and aeroplanes.

The conventional motor-car or aeroplane engine of today has reached such a state of development when operating on gasoline or equivalent easily vaporizable fuels that only small improvements may be expected from a further refinement of design. In fact, it is doubtful if the time devoted to its perfection would be well spent in view of the fact that what the world needs mainly today is not a better gasoline engine but an engine that will work better on a fuel costing about one-half to one-third what gasoline costs or is likely to cost in a couple of years.

The first effort to meet this situation was made in the direction of adapting the conventional engine to the use of kerosene, which proved, however, to be a much more difficult proposition than was expected at the start.

Two methods, singly or in various combinations, have been resorted to by designers of kerosene engines in order to make it possible to burn that fuel. The first and most obvious method has been to preheat the fuel, but this apparently leads to the break-up of the higher hydrocarbons present in kerosene and the evolution of free hydrogen and possibly formation of acetylene or acetylides. The presence of free hydrogen leads, however, to a very high acceleration of the rate of combustion of the mixture and creates the phenomenon generally known under the name of "kerosene knock."

The other way in which the solution of the problem of burning kerosene has been attempted has been by means of the extremely fine atomization of the fuel. There have been two considerations underlying this idea.

The first was to burn kerosene with air, not as a mixture of gases but somewhat in the same manner in which explosions of coal and grain dust take place; that is, converting the kerosene into such a fine "powder" or fog as to insure a very intimate contact between it and the air. The other consideration was the desire to vaporize the kerosene at a point far below its end point of distillation. If the kerosene is very finely broken up and heated to about 225 deg. the vapor tension between the extremely small drops and air is sufficient to vaporize the fuel.

Tests made by the present writer, however, have indicated that to secure this result the atomization of the kerosene must be very fine indeed, a condition not easily secured because of the high average viscosity of kerosene and the greater toughness of the surface skin. It proved possible to vaporize kerosene in conventional carburetors by using a large number (300 and more) of extremely small jets (⅛ in. deep and shaped as a semicircle 0.003 to 0.004 in. in diameter). Later tests have brought out a rather interesting fact, namely, that this arrangement of a large number of very small jets which gave good results on kerosene proved to be very poor for use with gasoline.

But even atomizing kerosene finely at the nozzle of the carburetor seems to be only half the battle and a number of other conditions must be satisfied before it is possible to obtain successful results.

The first question is that of delivering the atomized mixture to the engine cylinder which employs proper manifolding not only outside of the cylinder block casting but inside of it as well. Since a kerosene-air mixture carries the fuel largely in a state of a fog or very fine drops, any bends, loci of turbulence or cold places are apt to cause condensation of the kerosene.

In other words, kerosene-engine manifolds have to represent the nearest possible approach to a straight-line flow with the minimum of changes of direction and have to be designed from end to end with an eye to some relation like the Fanning formula. To take care of these conditions a design has been evolved, or rather adapted, in which the carburetor sits right at the cylinder head, the manifold is cast into the cylinder head and the mixture flows in an absolutely straight line from the mixing chamber of the carburetor to the valves; the only abrupt turn being at the valves, where the temperature conditions are such that condensation need not be feared.

Furthermore, the temperature in the manifold should be strictly controlled, it being desired to bring the kerosene-air mixture to a temperature of approximately 225 deg. without, however, exceeding it, and also without using an exhaust-gas heater which would involve a large frictional resistance to the flow of the mixture with attendant condensation. Because of this the entire work of preheating the kerosene-air mixture was thrown on the manifold itself by placing the manifold in the cylinder head, which latter has no jacket, while the walls of the cylinder are liquid-cooled. The head, therefore, is cooled partly by radiation and partly by the flow of gases through the manifold, and it has been found that with kerosene as fuel and an outlet-jacket-liquid temperature of about 210 deg. fahr. the temperature of the head is in the neighborhood of 350 deg. fahr., which is just that required to raise the temperature of the mixture flowing to about 225 deg. fahr. This resulted in a good mixture being delivered in good shape to the cylinder, and all that remained to be done was to burn it there properly, a problem easier stated than solved.

A large number of tests by the writer, confirmed by similar tests made by the Office of the Director of Military Aeronautics, War Department, have shown that the amount of crankcase dilution is directly related to the temperature of the engine and is much greater in a cold engine than in a warm one. Also, numerous tests have shown that in order to properly burn kerosene the cylinder-wall temperature has to be under good control and somewhat higher than for gasoline engines; the main reason for this being that, other things being equal, the rate of combustion of kerosene-air mixtures is considerably lower than that of gasoline-air mixtures, which may be expressed otherwise by saying that the *basic* rate of combustion of kerosene-air mixtures is lower than that of gasoline-air mixtures.

In fact, it would appear that the entire design of an engine should be built around the rate of combustion of the fuel-air mixture used in driving the engine. This factor was of course unconsciously taken into consideration by the early designers of gasoline engines, but the proportions derived from their practice have been, still unconsciously in the vast majority of cases, applied to kerosene engines. It becomes therefore of prime importance to determine by what factors the rate of combustion in an engine

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cylinder is governed, apart from the physical properties of the explosive mixture itself. The most important factor governing the rate of combustion in the cylinder of an internal-combustion engine is the temperature of the mixture, and because of this it becomes important to determine what affects the temperature of the mixture in the cylinder of an engine of the constant-volume type during the course of combustion.

In the first place, of course, the temperature of the mixture is materially affected by the temperature of the cylinder walls, which means temperature of the cooling fluid.

The next factor affecting the rate of combustion of the mixture is the compression available, which means, however, a good deal more than the "compression ratio," which is often alone taken into consideration.

The compression ratio, as such, determines only the upper limit of compression, that is, the compression pressure at maximum filling of the cylinder; but at partly open throttle there is a partial filling of the cylinder and a different final compression pressure. Hence a different final temperature of the charge. In other words, the final compression pressure depends not only on the compression ratio but also on the volumetric efficiency of the engine during the given cycle.

Therefore, if a kerosene-air mixture ignites well at, say, 500 deg. fahr. and if this temperature is produced by the compression in a given engine at maximum filling of the cylinder, at full throttle, at half throttle or half filling the compression pressure will be roughly one-half and the temperature of the mixture will be lower in accordance with well-known laws. But if combustion in a kerosene-air mixture proceeds at a certain suitable rate when this mixture is at an initial temperature of 500 deg., a much lower rate of combustion will be maintained when the temperature is, say, 375 deg., and the point may be, and actually is, reached when explosive combustion does not take place at all.

In common parlance this is described by saying that the engine "lacks flexibility" or "does not idle well."

This trouble is fundamental and does not depend on the design of a carburetor. There are only two ways to overcome it. One is by varying the temperature of the induced charge, making it colder at full throttle and warming it up at low throttle, which is, however, only a crude solution of the problem and does not meet all conditions that are encountered. Another method of meeting the same conditions would be to use a variable-stroke engine of such a construction that the full stroke is used in connection with wide-open throttle and a reduced stroke when the throttle is partly closed. It is very doubtful whether such an engine can be built with a mechanically operable piston, but its equivalent may be obtained in a somewhat roundabout way by using one of the variations of the superinduction principle. Thus, a design of engine is shown where the bottom of the cylinder is covered with a cushion of either air or inert gas when the engine is operating at low throttle.

Further consideration of the subject, especially with regard to fuels used heavier than kerosene, such as paraffin gas oil, having also lower rates of combustion, indicates, however, that compression pressure determines not so much the actual rate of combustion of the charge as the initiation of the combustion, while the actual rate of combustion at each instant depends on the expansion pressure obtaining at the preceding instant during the process of combustion. But the expansion pressure may be raised by ramming into the cylinder a greater charge than it will take when supplied with air at atmospheric pressure, which brings us to a point where we may consider what is known as a "superinduced" engine.

To sum up what has been said above, it may be stated that because of the low basic rates of combustion of the lower grades of fuel (from kerosene down to paraffin gas oil) it is hardly possible that the conventional motor may be made to handle them with the same flexibility as it does gasoline, and if lower grades of fuel are to be burned in our automotive engines these latter will have to undergo a much more thorough change in design than a makeshift adaptation, namely, a change that will bring about a high rate of combustion in a charge consisting of a fuel having a low basic rate of combustion. This condition can be accomplished by superinduction, and so far no other means have been indicated to produce the same result.

It may be stated in this connection that work which stops at enabling us to burn only kerosene will not relieve the present serious fuel situation for any appreciable length of time, because the supplies of kerosene cannot be easily increased to an extent sufficient to meet the demands of the automotive industries. Furthermore, the difference between the cost of gasoline and that of kerosene is not large now and would become still smaller if a large demand were created for kerosene. On the other hand, such fuels as paraffin gas oil with a heat content of about 140,000 B.t.u. per gal. sell for about 6.5 cents per gal. as compared with 23 cents for a gallon of gasoline having a heat content of about 125,000 B.t.u. per gal. It is therefore to these cheaper and far more plentiful fuels that we must look for a relief of the impending fuel shortage.

Briefly, superinduction may be defined as a method of operating an engine of the constant-volume type so that the pressure in the cylinder at the beginning of compression is higher than the atmospheric pressure.

The complete paper, after giving a brief account of the work done in this direction, describes an unconventional type of engine with two carburetors. The main carburetor feeding a conveniently located inlet valve is supplied with atmospheric air. The auxiliary carburetor feeding an inlet valve located at the bottom of the cylinder and uncovered by the piston at the end of the induction stroke is supplied with air delivered at a pressure of, say, 30 lb. abs. The operation is as follows: The main inlet valve opens as in conventional engines, but when the filling of the cylinder from the main inlet valve has been very nearly completed and a pressure of about 12 lb. abs. prevails, the auxiliary valve opens and the charge delivered therefrom raises the pressure at the beginning of the compression stroke to a value in the neighborhood, say, of 25 lb. abs.

In order to produce a balanced operation of the auxiliary carburetor the same pressure (i.e., 30 lb. abs.) is maintained in the carburetor inlet, the carburetor float chamber and the fuel tank, two fuel tanks being used — one for gasoline for the main carburetor and another for the auxiliary carburetor.

Furthermore, since there is a greater difference of pressure between the float chamber and the inlet manifold in the auxiliary carburetor than would have been in a conventional carburetor, a better atomization of the fuel is secured which makes it possible to use oils heavier than kerosene, such as, for example, paraffin gas oil. Moreover, while the compression pressure is roughly the same as in the conventional engine, the expansion pressure is a good deal higher, which makes it possible to secure a higher rate of combustion with paraffin gas oil as compared with what it would have been with conventional expansion pressures.

As regards the process of ignition, the top layer of the charge, which is mainly a gasoline-air mixture, is ignited first and by its combustion brings about conditions which permit an explosive combustion of the paraffin gas oil-air mixture, thus securing practically the same flexibility with the new fuel as with straight gasoline in conventional-type engines.

In the original article formulæ are given for computing the power output of superinduction engines of the type described, from which it appears that a four-cylinder 3.5 x 5 engine running at 1800 r.p.m. is capable of delivering 78.6 hp. as compared with 32.5 hp. for an engine of the conventional type. This means that the superinduction engine not only consumes a cheaper and more plentiful fuel, but that it is far more powerful than the conventional engines.

The basic idea of the paper is that the high-speed, high-efficiency fuel-oil engine that will take the place of the present extremely efficient gasoline engine such as is used in all our automotive equipment, has to be designed with a far clearer understanding of the processes of combustion than is evidenced by the engine of today. In other words, the good fuel-oil engine of tomorrow will have to be first and last a better engine intrinsically than anything we have today.

E. F. C. Water-Tube Boiler for Wood Ships

By F. W. DEAN,[1] BOSTON, MASS., and HENRY KREISINGER,[2] PITTSBURGH, PA.

The following paper describes and reports tests upon the standardized water-tube marine boiler designed by the United States Shipping Board, Emergency Fleet Corporation. In view of the large number of boilers needed (1352 ordered), the scarcity of steel and the desire to secure competitive prices, the water-tube type was adopted instead of the Scotch marine type, making it possible to have the boilers constructed in inland shops throughout the country, and effecting a reduction in the weight of steel of more than 9,000,000 lb. for the total order. The boilers had a grate area of 65.54 sq. ft., heating surface of 2500 sq. ft. and a commercial horsepower of 435 on the basis of the marine rating of 6 lb. of water to a square foot of heating surface per hour. Part 2 of the paper gives details of an investigation made by Mr. Henry Kreisinger of the Bureau of Mines on the mixtures of air and combustible in the boiler furnaces and of the temperature of the gases.

PART 1 DESCRIPTION OF BOILER AND RESULTS OF EVAPORATIVE TESTS

By F. W. Dean

IN 1917 the Emergency Fleet Corporation embarked upon a program of building a great fleet of wood ships for the purpose of quickly meeting a great emergency. Wood was selected, not only for accelerating delivery, but for reducing the demand for steel which was needed for steel merchant and naval vessels.

At first it was intended to build 1000 wood ships of 3500 tons deadweight capacity each, and each ship would require two boilers containing about 2500 sq. ft. of heating surface each. The problem of securing 2000 good-sized boilers was a serious one and naturally caused careful consideration of the relative merits of water-tube and Scotch boilers. The natural inclination was to use Scotch boilers, but the boiler-making capacity of the country on the sea coast, or on waters tributary thereto, was insufficient to produce them in a reasonable time, to say nothing of the capacity of the mills of the country to produce the steel and steel plates required if Scotch boilers were used.

It was decided to use water-tube boilers, as the weight of steel in one of these boilers, with casing, is 41,200 lb., while for the equivalent Scotch boiler it is 110,000 lb. The saving of steel for the 1352 boilers finally ordered was thus more than 9,000,000 lb.

Furthermore, the adoption of the water-tube type rendered most of the boiler shops of the country available at such inland places as Battle Creek, Mich., Chattanooga, Tenn., and Allentown, Pa. All told, they were built by 19 different contractors.

Still further the competition coming from the adoption of the water-tube type, taking into consideration prices asked by some of the regular makers of marine water-tube boilers, resulted in a saving which is estimated to have been about $7,000,000 for the requirements of the program. While the Emergency Fleet Corporation has been accused of extravagance, credit for this piece of economy should be given to it, and this is due to the engineering department.

A great advantage of the design made by the Emergency Fleet Corporation came from the fact that all of the boilers for the wood ships using the first 706 boilers were alike and differed only slightly from the later orders of 646 which were all alike. The differences in the design came from changing the number of baffles from three to four and in using Key handhole caps instead of plugs with copper ferrules.

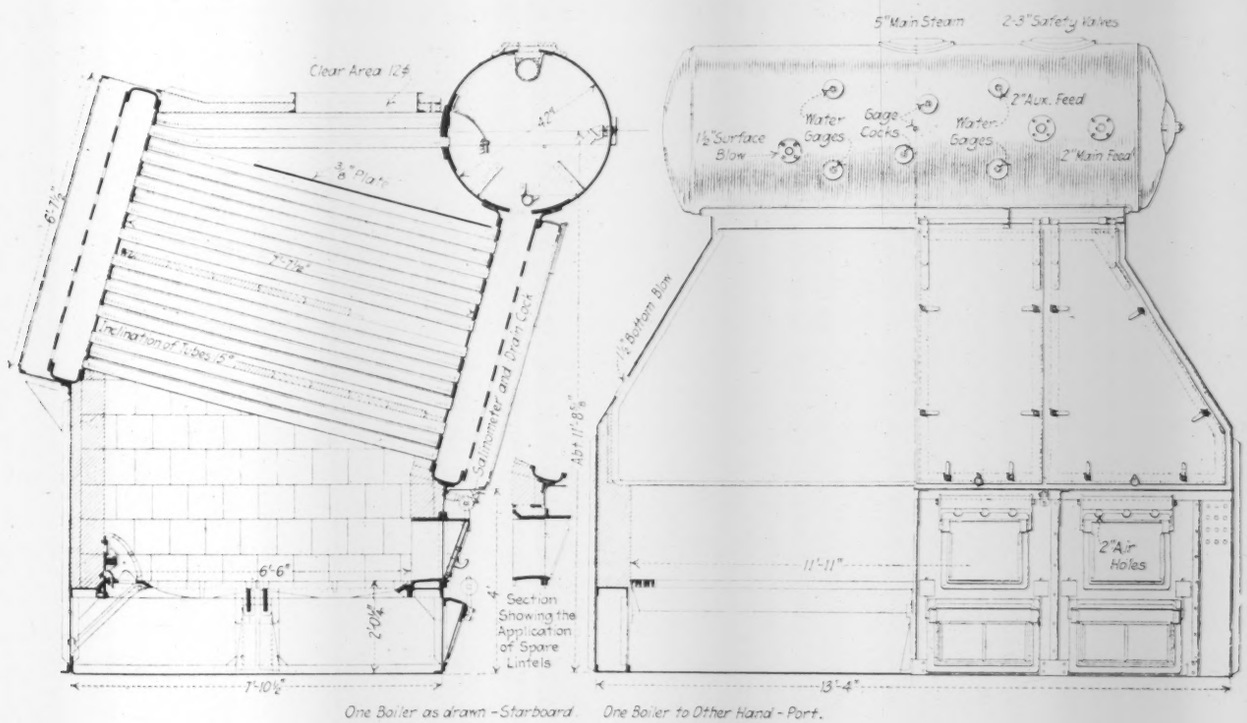

FIG. 1 THREE-PASS STANDARD WATER-TUBE MARINE BOILER FOR WOOD SHIPS

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DESCRIPTION OF THE BOILER

The boiler as first designed is shown in Fig. 1, and as later modified in Fig. 2. It consists of two headers, each composed of two plates, known as tube and handhole plates, connected at the edges by channel-shaped pieces, the two headers being connected by tubes which furnish most of the heating surface and form means of fastening the headers together. The front header is surmounted by a steam drum which is riveted to both the drum and header. Holes in the bottom of the drum within the limits of the saddle furnish the means of connecting the interior of the drum and header, and two rows of so-called circulating tubes connect the upper part of the back header with the drum and serve to conduct the steam to it.

The header plates are stayed together by means of hollow iron staybolts, the holes being ¾ in. in diameter. The handholes in the first 706 boilers were closed by means of tapered plugs surrounded by thin copper ferrules. The plugs had a threaded shank secured by a yoke and nut as is usual for handhole plates. It was soon recognized, however, that the Key cap is better and the 646 boilers afterward ordered were provided with them.

The drum was made with the longitudinal joint where the circulating tubes enter, there being here an inside and an outside strap. The tubes pass through the shell and both straps, but the holes in the shell are larger than the tubes and the expanding occurs only in the straps. The drum is reinforced at the bottom by means of an inside strap in order to make up for the plate section cut away by the holes already referred to.

The tubes are seamless hot-rolled steel. The baffles are of the longitudinal type, of which the first boiler tested had three, forming three passes as shown in Fig. 1. After some testing it was decided that it was best to place the lowest baffle on the lowest row of tubes in order to render the second and third rows of tubes more active as heating surface. In the first design these tubes did little good except such portions of them as extended across the first pass. When this change was being made it was seen that there was room for four passes and accordingly four baffles were inserted. This rendered the boiler somewhat more efficient, especially at the higher powers, and made the efficiency curve flatter than in the case of three passes.

In the three-pass boiler the upper baffle was of steel plate and the others of tiles, but in the four-pass boiler the two upper baffles were of steel and the indications are that the others might be of steel if the tubes were sufficiently near together to touch the baffles on both sides and thus conduct the heat from them into the water. In the four-pass boiler tested the baffle next to the lowest was made of steel, and although it merely rested on the tubes it stood the service. The outer end of the lowest baffle of this boiler was made of steel and although it was in contact with tubes on the bottom only it stood the service fairly well. Experience with steel baffles in a Foster boiler tested at Burlington, Iowa, showed that they stood so well that they were adopted in all positions in this boiler. By using steel baffles in the four-pass boiler, 34 more tubes can be put in. The four-pass boiler is shown in Fig. 2.

In the drum of the standard boiler there is the usual deflector plate which prevents the steam, as it comes through the circulating tubes, from passing across the drum and compels it to pass to the ends. This deflector was removed for a time and no difference in the behavior of the boiler could be observed except that the water as it appeared in the glasses was livelier. In a seaway other advantages might appear.

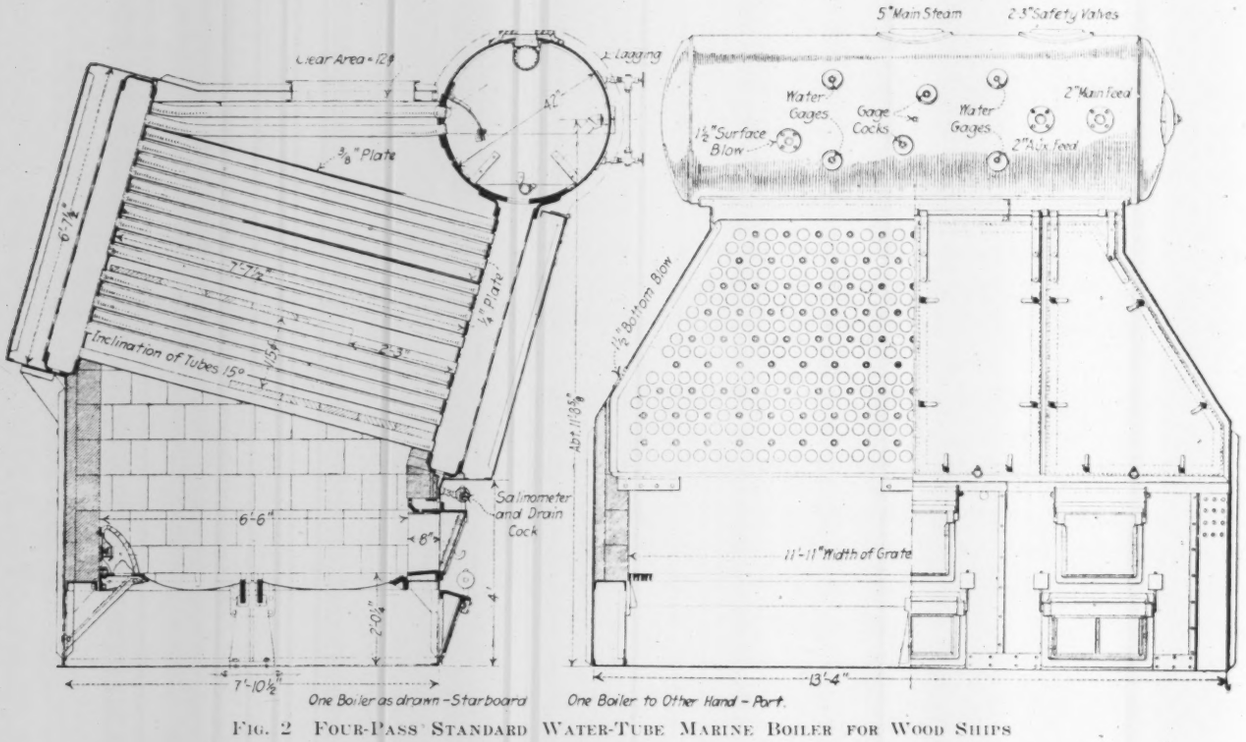

FIG. 2 FOUR-PASS STANDARD WATER-TUBE MARINE BOILER FOR WOOD SHIPS

In the top of the drum a perforated drypipe is used having eighty-eight ⅜-in. holes. This is a rather small area and it proved to have an important effect in separating moisture from the steam. This was determined by testing the boiler both with and without the drypipe. The reduction in the pressure of the steam in passing from the drum to the steam nozzle was determined by a mercury manometer. At ordinary rates of working the loss in pressure amounted to little, but when forcing it amounted occasionally for short periods to six or eight inches of mercury.

The casing of the boiler is built up of steel plates joined together by external and internal shapes secured to a channel frame at the bottom which rests on the keelson of the ship. At the front there are two vertical channels acting as columns which are secured to the channels and bolted to tees riveted to the bottom of the header. The rear header of the boiler rests on a shelf formed in the casing, and the casing is a close fit around the rear header. The front columns form the only rigid connection to the channel base, and the boiler is free to slide in the rear part of the casing. The channel base is bolted to the bottom of the ship and the casing holds the boiler firmly in place and is amply able to prevent rolling or pitching at sea or in a collision, all of which has been proved by

experience, including the latter, even without rolling or collision braces.

The front and back of the casing have sheet-iron doors covering the headers, and the space between the headers and doors is sufficiently great to accommodate soot blowers. These blowers, which are found to be of great importance, blow through the hollow staybolts.

The boilers are equipped with bottom and surface blows, a duplex safety valve, two water glasses, a set of three gage cocks, main and auxiliary feeds, a salinometer cock, a basket of zinc plates and an internal perforated feedpipe.

In the three-pass boiler there are four fire doors and four ash-pit doors, but in the four-pass boiler there are three of each. These doors are of the in-swinging type. Above each door there is a hollow perforated lintel with air freely entering through holes in the casing and on the sides of the doors there are perforated jambs with air supplies from the outside. All of these air openings are not only useful in protecting the parts from burning, but promote economy, for it is found that none too much air enters the furnace through them.

The grates are of the fixed type of double bars in two lengths, and have ½-in. air and ½-in. iron spaces.

Across the back end of the furnace there is a cast-iron bridge wall with narrow air spaces which saved nearly 2 per cent of coal, perceptibly diminished smoke, improved the gas analyses, saved the back brickwork and reduced the time and labor of cleaning the fires nearly 50 per cent.

Dimensions of Boiler

The following are the leading dimensions of the boiler:

Width of casing at floor level	13 ft. 4 in.
Length of casing at floor level	7 ft. 10½ in.
Height of center of drum above floor	11 ft. 8¾ in.
Thickness of header plates	11/16 in.
Width of water spaces of headers	8 in.
Outside diameter of tubes	3 in.
Exposed length of tubes between headers	7 ft. 7½ in.
Number of tubes between headers	388
Number of tubes between rear header and drum	21
Inside diameter of drum	42 in.
Thickness of drum plates	5/8 in.
Width of furnace	12 ft.
Depth of furnace	6½ ft.
Height of furnace at center	3 ft. 8 in.
Firing doors	15 in. by 18 in.
Width of grate	11 ft. 11 in.
Depth of grate without bridge wall	6 ft. 6 in.
Depth of grate with bridge wall	5 ft. 8 in.
Grate area without bridge wall	77½ sq. ft.
Grate area with bridge wall	67½ sq. ft.
Heating surface, fire sides	2518 sq. ft.
Thickness of brick lining	8½ in.

The Evaporative Tests

In the beginning it was decided to use Georges Creek Cumberland coal from the Big View vein on all tests in order to have a standard coal of good and uniform quality, low volatile content, and high-fusing clinker.

It was also decided to make tests with fixed grates, shaking grates, firebox without a bridge wall, with the iron bridge wall already mentioned, a brick bridge wall covering the same area as the other, and several kinds of oil burners, using Mexican oil. Mexican oil was selected because that is the oil that will be used chiefly in future.

The three-pass boiler was erected with the baffles in the positions and of the lengths in the original drawing, but the first test showed that they were not sufficiently long. Several of the earlier tests were made with the grate of the full size, that is to say, without the iron or the brick bridge wall. By the addition of the iron bridge wall, admitting air around the fire doors, lengthening and otherwise changing the baffles, and studying the method of firing, the efficiency of the three-pass boiler was raised from about 60 per cent to about 71 per cent based upon dry coal, and to about 73 per cent based upon combustible. The efficiency of the four-pass boiler was about 72½ per cent based on dry coal, and based upon combustible exceeded 74 per cent on two tests. These tests were made when firing by hand, but when using the "Type E" stoker higher efficiencies were obtained.

TABLE 1 RESULTS OF TESTS OF FOUR-PASS BOILER EQUIPPED WITH TWO-TYPE "E" UNDERFEED STOKERS

		April 8	April 9	April 13	April 12
1	Date, 1919				
2	Duration, hr.	24	24	24	24
	Dimensions and Proportions				
3	Grate area, sq. ft.	77.50	77.50	77.50	77.50
4	Heating surface, sq. ft.	2500	2500	2500	2500
5	Ratio grate area to heating surface	32.26	32.26	32.26	32.26
	Average Pressures				
6	Gage pressure, lb.	199.00	199.00	197.00	198.40
7	Atmospheric pressure, lb.	14.51	14.51	14.50	14.44
8	Absolute pressure, lb.	213.51	213.51	211.50	212.84
9	Draft between damper and boiler, in.	0.35	0.85	1.40	1.43
	Average Temperatures				
10	External air, deg. fahr.	47	53	50	44
11	Fire room, deg. fahr.	61	68	63	62
12	Feed water, deg. fahr.	66	67	66	63.40
13	Escaping gases, deg. fahr.	535	591	618	659
	Fuel				
14	Moist coal consumed per hour, lb.	1189	1614	2000	2392
15	Moisture in coal, per cent	2.92	2.82	3.35	4.14
16	Dry coal consumed per hour, lb.	1155	1568	1933	2293
17	Dry refuse per hour, lb.	126	160	184	214
18	Dry refuse in per cent	10.90	10.20	9.50	9.30
19	Combustible consumed per hour, lb.	1029	1408	1749	2079
	Quality of Steam				
20	Moisture in steam, per cent	0.75	0.75	0.85	1.02
	Heat Value of Coal and Efficiency				
21	Heat value of one pound of dry coal, B.t.u.	14040	14342	14234	14404
22	Efficiency of boiler based on dry coal, per cent	79.20	75.00	72.50	71.40
23	Efficiency of boiler based on combustible, per cent	80.20	76.50	72.90	72.50
	Water				
24	Water supplied to boiler per hour, lb.	11124	14588	17253	20390
25	Dry steam generated per hour, lb.	11041	14479	17106	20182
26	Factor of evaporation	1.20	1.20	1.20	1.204
27	Equivalent evaporation from and at 212 deg. per hour, lb.	13249	17375	20527	24299
	Evaporative Performance				
28	Water evaporated per pound of dry coal, lb.	9.55	9.23	8.87	8.80
29	Equivalent from and at 212 deg., lb.	11.47	11.08	10.62	10.60
30	Water evaporated per pound of combustible, lb.	10.85	10.21	9.80	9.66
31	Equivalent from and at 212 deg., lb.	12.90	12.34	11.70	11.68
	Rate of Combustion				
32	Dry coal burned per sq. ft. grate per hour, lb.	14.90	20.23	23.80	29.60
33	Dry coal burned per sq. ft. heating surface per hr., lb.	0.46	0.62	0.77	0.92
	Rate of Evaporation				
34	Water evap. from and at 212 deg. per sq. ft. h. s. per hr., lb.	5.30	6.95	8.21	9.72
35	Water evap. from and at 212 deg. per sq. ft. grate per hr., lb.	170.90	234.20	264.00	313.60
	Power of Boiler				
36	Commercial horse power for land use, hp.	384	504	595	704
37	Excess above commercial rating of 250 hp., per cent.	54	102	138	182
38	Marine rating in water evap. per hr. from and at 212 deg., lb.	15000	15000	15000	15000
39	Equiv. commercial hp. of marine rating, hp.	435	435	435	435
40	Excess above or below marine rating, per. cent.	12 below	16 above	37 above	62 above

Results of Tests

In the complete paper four tables are given which show the general results of the tests of the three-pass and four-pass boilers under all of the conditions, both with hand and stoker firing. Those for the four-pass boiler with stoker firing are given below in Table 1. No results with oil firing are given because those tests are now in process.

While it was intended to test the boiler at the marine rating in general, which is to evaporate 6 lb. of water per sq. ft. of heating surface per hr., other rates were used, especially with the four-pass boiler. In the test of Dec. 18, 1918, the four-pass

boiler (hand-fired) was worked at 131 per cent of marine rating and 229 per cent of land rating. Even at this high rate the efficiency was about 71 per cent, and but little below that of lower rates. With the stokers the boiler was operated at 162 per cent of marine rating and 282 per cent of land rating. At this rate the evaporation was 9.72 lb. per sq. ft. of heating surface per hr. from and at 212 deg., and the efficiency was 72.3 per cent based upon combustible. Based upon the total area of grate for hand firing the coal consumption was at the rate of 29.6 lb. per sq. ft. of grate per hr. The coal consumption per sq. ft. of heating surface per hr. on this test was 0.92 lb. The test of April 8 (Table 1), shows a very high efficiency, but this is open to suspicion because the heat balance did not work out quite properly, due, it is thought, to an error in the coal weight of one hour. All of the tests given in Table 1, were of 24 hr. duration each, excepting that of April 13, which was for 22 hr.

The conclusion arrived at is that the boiler is of excellent efficiency, and that the four-pass boiler is well adapted to overloads. This is due to its having four passes. The only defect of the four-pass boiler is, as might be expected, that there is considerable absorption of draft in the passes, and the greatest loss was in the third pass from the bottom. The third baffle was lowered one tube, but the great loss continued, and it was then restored to its former position.

Among the experiments tried with this boiler were those to determine whether the number of circulating tubes and the number of holes in the bottom of the drum connecting its water space to that of the front header were excessive. Half of them, together and separately, were closed, but no effect could be observed. The conclusion was that an unnecessary number of such tubes and openings are used in this type of boiler, and by reducing them the drum will be made a safer structure.

The quality of the steam was most satisfactory when the water was carried at a proper level and it was necessary to carry it near the top of the glass before the limit of a throttling calorimeter was reached. The quality of the steam is given in all of the tables.

PART 2 PRELIMINARY TESTS

By Henry Kreisinger

THIS part of the paper presents some of the results of special investigations conducted by the Fuel Section of the Bureau of Mines in connection with the tests of the three-pass and four-pass marine boilers shown in Figs. 1 and 2. Outline diagrams illustrating the methods of testing these boilers are given in Figs. 3 and 4. The special investigations consisted of the study of combustion in the furnaces and the temperature of gases as they flow through the boiler. This study was carried on by the analysis of samples of furnace gases collected at various points in the setting.

Fig. 3 is a diagram of the three-pass boiler as originally designed. After the first few tests the baffles were extended, making smaller the gas passages between the ends of the baffles and the water legs. Other changes were also made as the investigation indicated the need for them. The points at which gas samples were collected are indicated by the small circles designated by the capital letters *A*, *A'*, *B*, *C*, *D*, *E*, *F*, *G*, *H*, and *I*.

Admission of Air Over Fuel Bed

During the first six tests a large amount of combustible gas passed out of the furnace and either burned at the base of the stack, causing high flue-gas temperature, or escaped unburned. It was apparent, therefore, that more air had to be admitted over the fuel bed and better means provided for mixing it with the combustible. Admission of air through the holes in the fire being undesirable because the size of holes cannot be controlled, a number of ½-in. holes were accordingly made in each firing door; the small opening in the first baffle at *I* was closed and the baffle extended, making the gas passage between the end of baffle and the rear water leg 36 in. This had the effect of causing the air admitted through the firing door to flow farther to the rear of the furnace and thus facilitate better mixing with the combustible gases.

In addition to these changes, Wager's bridge wall was installed to supply additional air to the rear part of the furnace. See Fig. 4. The bridge wall consists of a large number of cast-iron bars

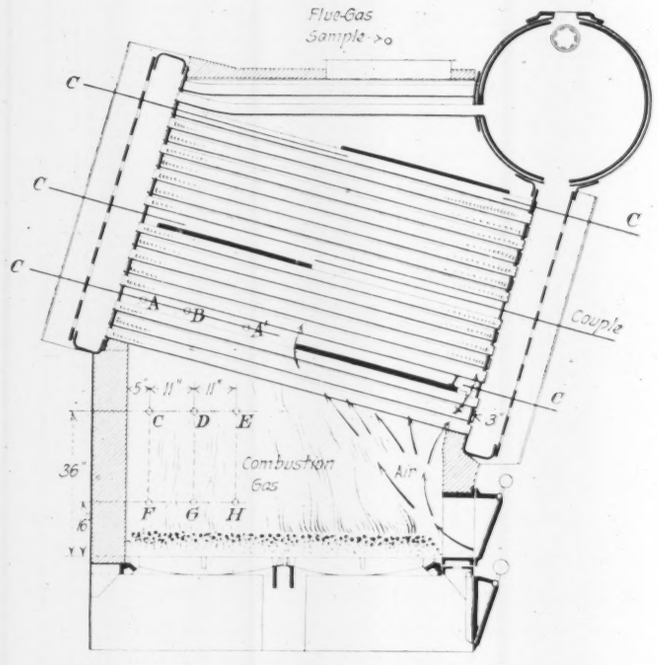

Fig. 3 Diagram Showing Method Used in Testing Three-Pass Type of Boiler

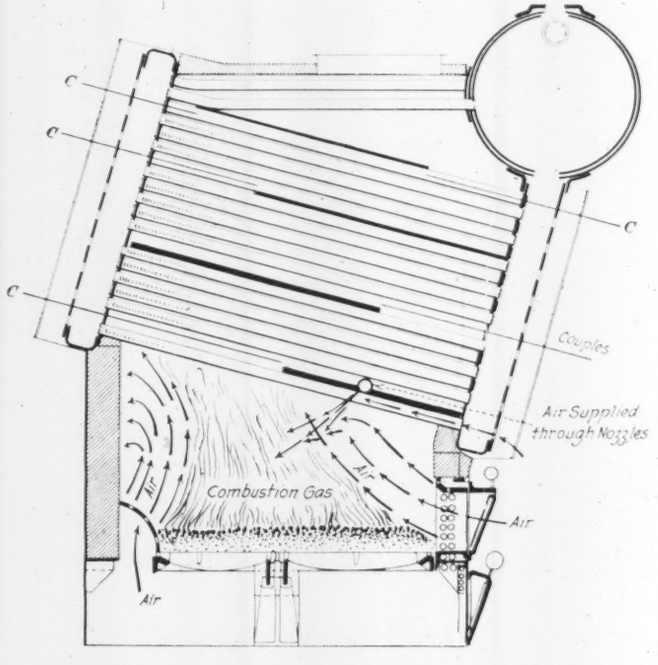

Fig. 4 Diagram Showing Four-Pass Type of Boiler With Facilities for Introducing Air Over Fuel Bed

placed against the rear wall of the furnace, and forms a structure similar to a plain grate. The air passes into the furnace through narrow slots between the bars, and is regulated by the thickness of the fuel bed near the bridge wall. The thicker the fuel bed the greater is the area of the air spaces covered with coal, and the

smaller is the quantity of air flowing into the furnace. The air enters in a large number of thin streams.

With the air admitted through the firing door and through the bridge wall, the combustible gases rising from the fuel bed are squeezed between two streams of air coming in from two different directions and the mixing is greatly aided. The direction of the streams of air admitted over the fuel bed under these conditions is indicated in Fig. 4. The total area for admission of air over fuel bed was about 160 sq. in., or approximately 2 per cent of the grate area.

Mixing of Air and Combustible by Different Methods of Admitting Air over Fuel Bed

In order to determine the effect on the mixing and combustion of various methods of admitting air over the fuel bed, a set of six gas samples was taken in the furnace and two in the gas passage between the rear water leg and the end of the first baffle. The points at which these samples were taken are indicated in Fig. 3 by the small circles designated by the capital letters *A* to *H*. The analyses of these gas samples are shown graphically in Fig. 5.

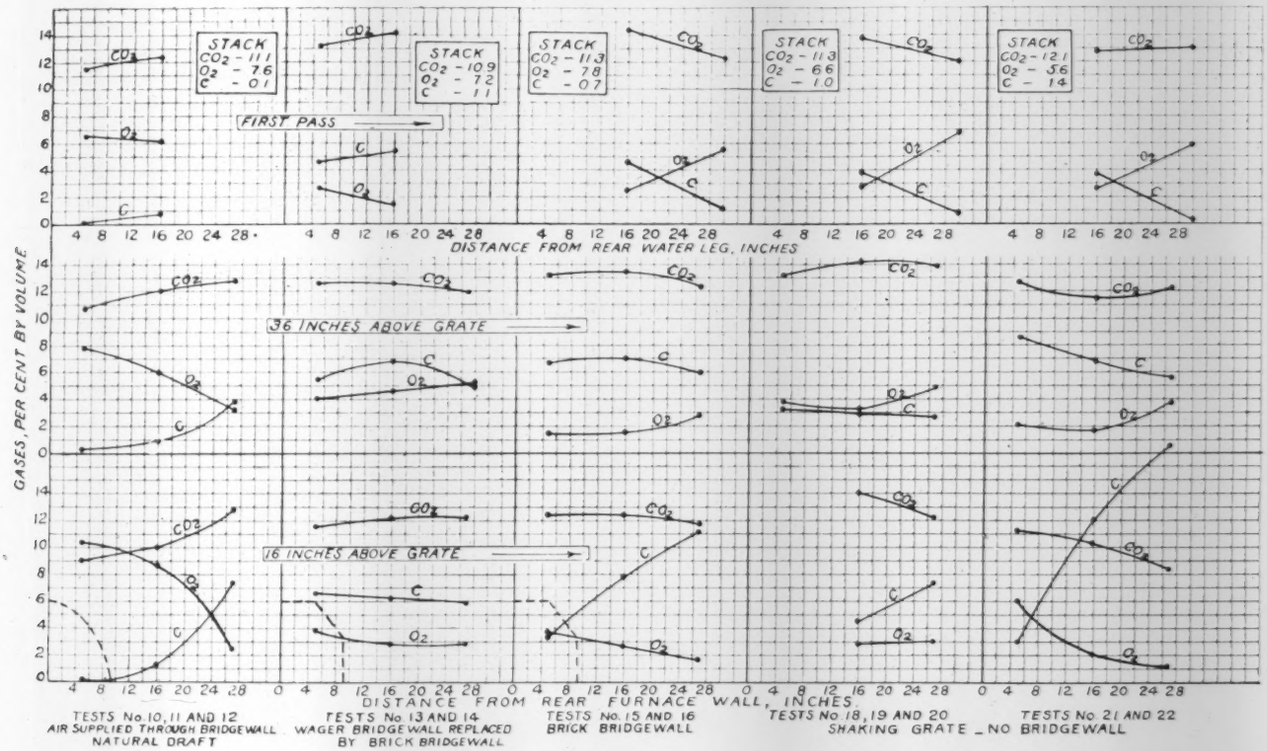

Fig. 5 Composition of Gases in Furnace with Various Methods of Introducing Air Over Fuel Bed and the Effectiveness of Mixing. Three-Pass Water-Tube Boiler

Analyses of Gas Samples Shown by Diagrams in Fig. 5

Fig. 5 shows five groups of tests, each group being represented by one of the five vertical charts. The furnace conditions under which each group of tests was made are indicated by the label at the foot of each chart. Each of the three large squares in each vertical chart gives the samples taken at one elevation above the grate, e. g., the lowest square gives the analyses of samples taken 16 in. above the grate.

The abscissæ of the lower two squares give the distance of sampling from the rear of the furnace wall; and those of the highest square give the distance of the point of sampling from the rear water leg. The ordinates give the percentage of the gases. The points giving the percentage of each gas at one elevation above the grate are connected by a smooth curve, principally to make the chart clearer. The analysis of the flue gases collected at the same time at the base of the stack is given in the small tables in the top squares. The location where the stack gases were taken is also indicated in Fig. 3.

The first group of tests gives the analysis of the furnace gases when the air over fuel bed was admitted through the firing door and through Wager's bridge wall. The chart is intended to show how the air admitted through the bridge wall mixes with the gases and affects combustion. The sample taken 16 in. above the grate and 5 in. from the rear wall shows practically no combustible gas, over 10 per cent of free oxygen, and about 9 per cent CO_2. The sample taken 27 in. from the rear wall shows about 7½ per cent of combustible, only 2½ per cent of oxygen, and nearly 13 per cent of CO_2. Apparently at this level the oxygen admitted through the bridge wall did not have a chance to penetrate far enough toward the center of the furnace to help in the combustion. The sample taken 36 in. above the grate and 5 in. from the rear wall shows less than 8 per cent of oxygen, a trace of combustible gas, and nearly 11 per cent CO_2. At this elevation above the grate the sample taken 27 in. from the rear wall shows less than 4 per cent combustible gas, about 3 per cent of oxygen, and nearly 13 per cent of CO_2. Comparison of the analyses of samples taken at these two elevations indicates that the air admitted through the bridge wall, in rising about 2 ft., has penetrated to a considerable depth into the stream of combustible gases rising from the fuel bed.

In the first pass the composition of the gases in the first 16 in. from the rear wall is nearly uniform, showing that the air admitted through the bridge wall mixed well with the combustible gases and did not pass out of the furnace in a separate stream. The stack gases showed, at the same time, 11.1 per cent CO_2 and only 0.1 per cent combustible, indicating a good combustion.

The second and third vertical charts give the analyses of gases of two groups of tests made with Wager's bridge wall replaced by a brick wall of similar shape, but having no provision for air admission. The shape of this brick bridge wall is shown by the dotted lines in the lower left-hand corners of the lowest squares. In both of these groups of tests the percentage of oxygen in the

samples taken in the furnace is low, and the percentage of combustible gases is high, clearly indicating the lack of sufficient air supply. The stack gases of these two groups of tests contain a considerable amount of combustible, although the percentage of free oxygen is about the same as it was in the groups of tests made with Wager's bridge wall. Although the air found its way into the furnace it was not introduced close enough to the fuel bed to bring the combustion nearly to completion before the gases left the furnace. In the second group of tests the gases passed out of the furnace still containing about 5 per cent of combustible, and in the third group they contained 3 per cent of combustible gas. It should be noted, however, that in the third group of tests the samples collected in the first pass were taken farther away from the rear wall, and their analyses show the presence of the air admitted through the firing doors, the sample taken 30 inches from the rear water leg showing more free oxygen than the sample taken only 16 in. from it.

The tests of the fourth and fifth group were made with a shaking grate and no bridge wall of any description. The samples taken 16 in. above the grate indicate that a small quantity of air passed into the furnace close to the rear wall, but it was not sufficient to have much effect on the combustion. The percentage of combustible remained high even when the gases reached the first pass. In these two groups of tests the samples taken in the first pass 30 in. from the rear water leg show the effect of the air admitted through the firing door. The stack samples show over one per cent of combustible gas and lower oxygen than either of the three previous groups. The lack of proper admission of air over fuel bed is clearly indicated in these last two groups of tests. The advantage of air admission through Wager's bridge wall was clearly demonstrated and it was therefore used on all subsequent tests with hand-fired furnaces.

Effect on Combustion of Different Methods of Admitting Air Over Fuel Bed

In a similar way the effect on combustion of various methods of admitting air over the fuel bed was shown by means of tests made on the four-pass standard boiler of Fig. 4. The samples were taken similarly to those on the test with the three-pass boiler, the points at which they were taken being indicated by the abscissæ and the label in each square.

The first group of tests was made with the air supplied over the fuel bed, through the firing door, and through Wager's bridge wall. Sixteen inches above the grate the admission of air through the bridge wall was apparent only in the sample taken 5 in. from the rear wall. Samples taken 36 in. above the grate and in the first pass indicated fairly uniform distribution of the air but an insufficient quantity of it. Apparently during these tests the fuel bed near the bridge wall was carried too thick. Had a thinner fuel bed been carried the combustible in the first pass would have been much lower.

The second group of tests was made with the air over fuel bed being supplied with natural draft, through Wager's bridge wall, and through the firing doors, and in addition to this also under pressure of 2 in. of water through 17 half-inch nozzles from a 3½-in. pipe placed between the first and second rows of tubes, as indicated in Fig. 4. The object of the air forced in through these nozzles was to force the air supplied through the firing door into the center of the stream of combustible gas rising from the fuel bed and cause intimate mixing. The action of these nozzles is shown in Fig. 4. The samples collected in the first pass showed fairly uniform mixture and lower percentage of combustible than was obtained when the air was admitted only through the bridge wall and through the firing door. However, the amount of combustible was a little too high, indicating that not quite enough air was admitted.

The third group of tests was made with air admitted through the firing door, and with natural draft and air admitted through Wager's bridge wall under a pressure of ⅜ in. of water. In this case the air admitted through the bridge wall tended to flow in a separate stream close to the rear wall without penetrating very deep into the stream of combustible gas. The analysis of the samples taken in the first pass showed that the excess of air decreases as the distance from the rear water leg increases. On the whole, the admission of air through the bridge wall under pressure proved to be undesirable in this type of furnace. The tests represented by the second group showed conditions most favorable to complete combustion. However, the installation of the nozzles entails undesirable complications in boiler plants of ships. The conditions represented by the first group recommend themselves by their simplicity and effectiveness when attention is given to the proper thickness of fuel bed next to the bridge wall.

Temperature Measurements

The temperatures were measured with thermocouples inserted into the setting through the hollow staybolts and moved across the gas passages, as indicated by the straight lines labeled "couples," or *C*, in Figs. 3 and 4. The temperatures were measured across the spaces between the ends of the baffles and the water legs.

[The complete paper concludes with a discussion of charts showing the temperature measurements at various distances from the front and rear water legs of both the three-pass and four-pass boilers, the former first with short baffles and then with long baffles, the latter with long baffles. A figure is also given which shows the average temperature drop of the gases along their path of travel through the four-pass boiler. — EDITOR.]

Government Insurance for Ex-Service Men

A series of decisions issued by the Director of the Bureau of War Risk Insurance with the approval of the Secretary of the Treasury providing for more liberal conditions of reinstatement of lapsed or canceled insurance, should prove of interest to all ex-service men. The provisions of Treasury Decision No. 47, allowing eighteen months from the date of discharge for reinstatement upon payment of only two months' premiums on the amount of insurance to be reinstated, are still retained, but that decision is liberalized by a new provision that men out of the service are permitted to reinstate by merely paying the two months' premiums without making a statement as to health at any time within three calendar months following the month of discharge. After the three months following the date of discharge have elapsed, a statement from the applicant to the effect that he is in as good health as at the date of discharge or at the expiration of the grace period, whichever is the later date, will be required together with a written application for reinstatement and the tender of two months' premiums on the amount of insurance he wishes to reinstate.

In order to give all former service men whose insurance has lapsed or been canceled, a fair chance to reinstate their insurance, including men who have been out of the service eighteen months or more, and who are therefore barred from reinstatement under the former ruling, a special blanket ruling is made which allows all ex-service men to reinstate their insurance before December 31, 1919, provided that each applicant is in as good health as at date of discharge or at expiration of the grace period, whichever is the later date, and so states in his application. Of course it is necessary that he tender the two months' premiums on the amount of insurance he wishes to reinstate.

Service men who reinstated their insurance by payment of all back premiums prior to July 25, 1919, when the decision requiring payment of only two months' premiums went into effect, upon written application to the Bureau may have any premiums paid in excess of two applied toward the payment of future premiums. For example, if after a policy had elapsed for six months, a man reinstated and paid six months' premiums instead of two, he may secure credit for four months' premiums. The provisions for reinstatement do not, however, protect a man until he actually reinstates. If he waits he may not be in as good health as he was at the time of discharge and consequently may not be able to secure reinstatement.

Flow of Water Through Condenser Tubes

By WILLIAM L. DE BAUFRE,[1] LINCOLN, NEB., AND MILTON C. STUART,[2] ANNAPOLIS, MD.

In this paper the authors give particulars regarding an extended series of tests recently conducted at the United States Naval Engineering Experiment Station at Annapolis, Md., to determine the friction loss of water flowing through ¾-in. No. 18 gage standard condenser tubes. The investigations covered variable velocities, water temperatures, and tube length, as well as the effect of both fresh and salt water. The results obtained are presented in tabular form and from them a general formula has been derived which gives the total drop in pressure due to entrance and exit losses and to frictional resistance within the tube.

THERE was conducted recently at the U. S. Naval Engineering Experiment Station, Annapolis, Md., an investigation upon the friction loss of water flowing through ⅝-in. standard condenser tubes of No. 18 gage, 0.522 in. in internal diameter. The principal variables were velocity and temperature of water, and tube length. The investigation also covered the variation in friction loss with clean tubes and tubes as received, and the effect of fresh and salt water. The computations were made in such a manner that losses at the tube ends and along the tube could be separated, the results being expressed in a general formula.

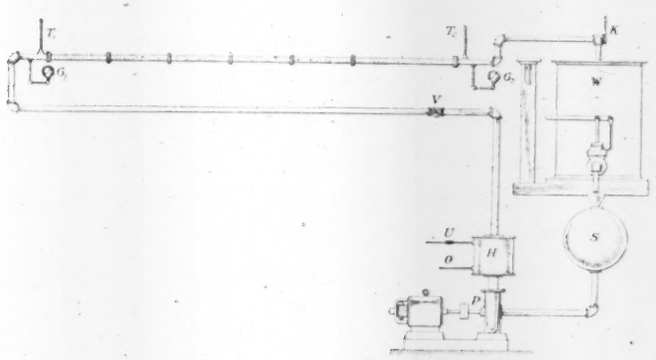

FIG. 1 DIAGRAM OF TEST APPARATUS

A number of sections of 3-in. iron pipe were assembled with flanges as indicated in Fig. 1. A corresponding number of lengths of ⅝-in. condenser tubing were obtained, and two brass blank flanges prepared to serve as tube sheets. These tube sheets could be inserted between any two pairs of flanges, thus enabling tube lengths of approximately 5, 8, 11, 14, 17, and 20 ft. to be tested. The tubes were held in place by ordinary screwed glands in the tube sheets, and packed with cotton held between two fiber washers as shown in Fig. 2. They were supported by sheet-iron disks between the intermediate pairs of flanges.

Referring to Fig. 1, water from the storage tanks S was pumped by the motor-driven centrifugal pump P through the heater H to the condenser tube indicated by the dotted lines. From the condenser tube the water was discharged into the two tanks W, where it was weighed before being discharged into the storage tank S below. The centrifugal pump P ran at constant speed, the rate of flow of water being regulated by valve V. The temperature of the water as indicated on thermometers T_1 and T_2 was regulated by the valve U admitting steam to the heater H. The condensed steam was discharged through O into a trap not shown. Gages G_1 and G_2 served to measure the pressures before and after the tube.

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With each tube length a number of runs were made with distilled water at temperatures of 85, 100, 130, 160, and 190 deg. fahr. and with rates of flow up to about 7500 lb. per hr. corresponding to

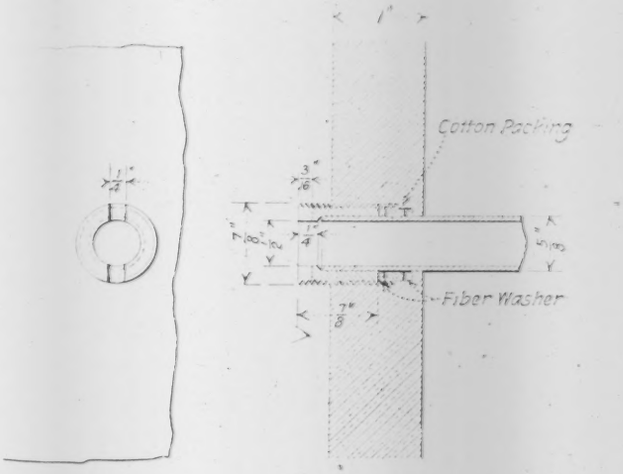

FIG. 2 METHOD OF SECURING CONDENSER TUBE IN TUBE SHEET

a velocity of about 22 ft. per sec. A few runs were first made with the tube in the condition as received and at 100 deg. fahr. The tube was then cleaned by pushing through it a small rag which had been soaked in kerosene. After cleaning, the complete set of runs, numbering in all 337, was made and the results obtained are given in Table 1 of the complete paper. In order to check the constancy of the results from day to day, a certain pressure drop and rate of flow were selected as a standard at each temperature.

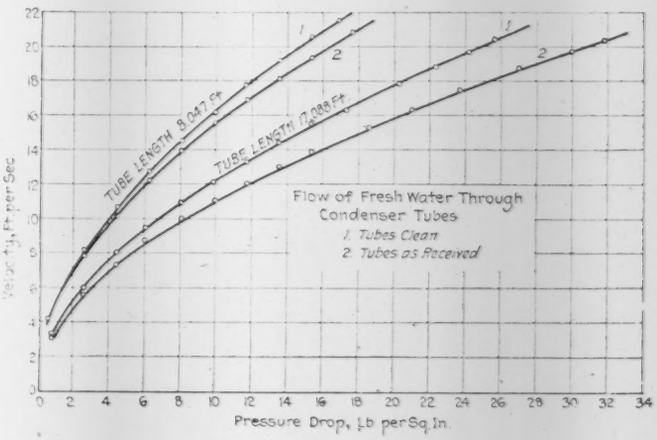

FIG. 3 CURVES SHOWING THE EFFECT OF CLEANING TUBES

and the run under these conditions was repeated when starting up in the morning and just before shutting down at night.

After completing the runs with distilled water, which began with the longest tube and ended with the shortest one, the longest tube was again installed in order to make runs with salt water and compare the results with the data obtained for fresh water. A few runs were repeated with fresh water and then duplicated with salt water at both 70 and 100 deg. fahr. The salt water was prepared by adding to the fresh water one thirty-second of its weight of salt, in order to approximate the normal density of sea water.

For the several tube lengths it was decided to use entirely different tubes rather than to take one long tube and cut off parts to obtain the shorter tubes. The results therefore include the variations that are liable to occur with commercial tubes of this size and gage.

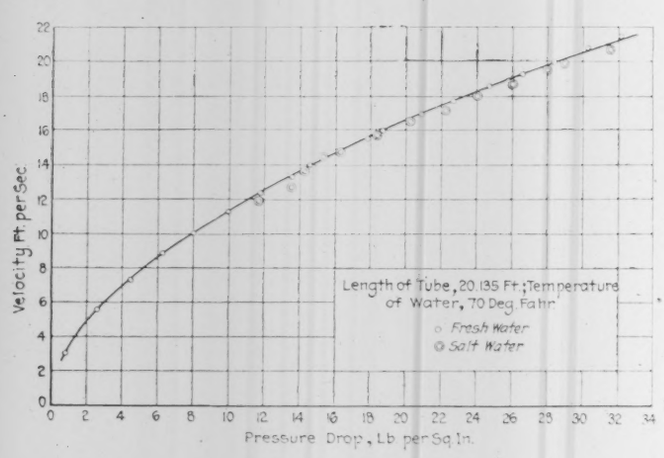

FIG. 4 CURVES SHOWING A COMPARISON OF THE EFFECTS OF SALT AND FRESH WATER FLOWING THROUGH CONDENSER TUBES

The effect of cleaning the tubes is shown in the curves of Fig. 3, and similar curves for four other tube lengths are given in the complete paper. As received from the manufacturers condenser tubes apparently offer a resistance to the flow of water 10 to 20 per cent greater than after cleaning them. A more thorough cleaning would probably have still further reduced the frictional resistance. To approximate actual condenser conditions it was deemed advisable

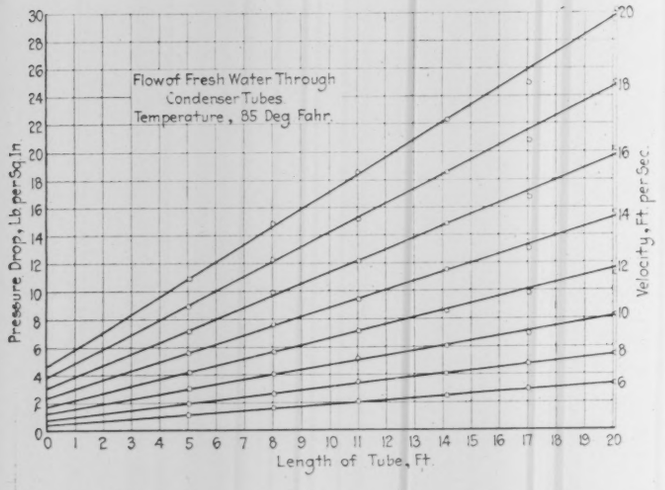

FIG. 5 CURVES SHOWING THE RELATION OF PRESSURE DROP TO TUBE LENGTH WITH WATER AT 85 DEG. FAHR.

to add about 20 per cent to the tabulated results obtained with cleaned tubes.

The curves of Fig. 4 show that the resistance with salt water having a salinity of one-thirty-second, equivalent to that of sea water, was practically the same as with fresh water. Consequently no further corrections are necessary to apply the results obtained in this investigation to condenser conditions on board ship.

In order to separate the loss of head at entrance and exit from the frictional resistance through the tubes, there were plotted in Figs. 5 to 7, inclusive, the pressure drop versus the tube length for various velocities. The points plotted in these figures were not taken directly from Table 1, but from faired curves (not included in this paper) of all runs made. By prolonging the straight lines for each velocity back to zero tube length, there was obtained the loss of head, or pressure drop, at entrance and exit.

The total drop in pressure of water flowing through a condenser tube may be expressed by the formula —

$$P = P_1 + P_2$$
$$= K_1 V^n + K_2 L V^m$$

where

P = total drop in lb. per sq. in.
P_1 = drop in lb. per sq. in. due to entrance and exit losses
P_2 = drop in lb. per sq. in. due to frictional resistance within the tube
n = velocity exponent for entrance and exit losses
m = velocity exponent for frictional resistance within the tube
L = tube length in ft.
K_1 = factor for entrance and exit losses, and
K_2 = factor for frictional resistance.

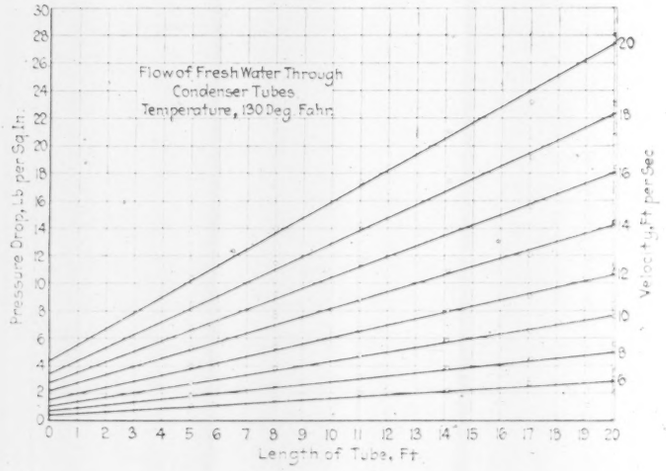

FIG. 6 CURVES SHOWING THE RELATION OF PRESSURE DROP TO TUBE LENGTH WITH WATER AT 130 DEG. FAHR.

Theoretically, the entrance and exit losses should vary as the square of the velocity. This is confirmed experimentally by the curves plotted in Figs. 8 to 10, inclusive, from the pressure drops in Figs. 5 to 7, corresponding to zero tube length. The velocity

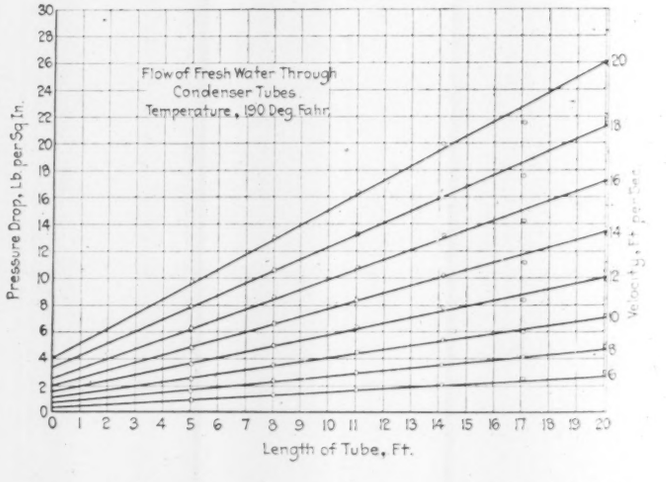

FIG. 7 CURVES SHOWING THE RELATION OF PRESSURE DROP TO TUBE LENGTH WITH WATER AT 190 DEG. FAHR.

exponent for the frictional resistance within the tube should lie between 1 and 2. The curves in Figs. 8 to 10 for the loss per foot of tube length were obtained by plotting the slopes of the straight lines drawn in Figs. 5 to 7. The exponent in all cases was found to be 1.83.

The following values of K_1 and K_2 were taken from the curves of Figs. 8 to 10, inclusive, as well as from two other figures in the complete paper for temperatures of 100 deg. and 160 deg.

Temperature, deg. fahr.	K_1	K_2
85	0.0123	0.0052
100	0.0111	0.0051
130	0.0107	0.0048
160	0.0101	0.0047
190	0.0097	0.0046

These values are plotted in Fig. 11.

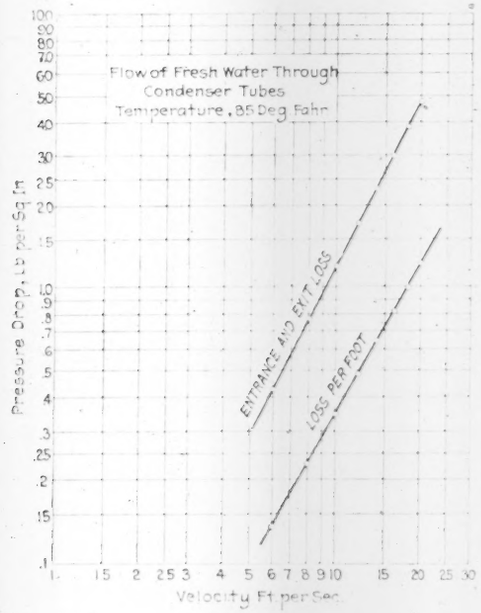

FIG. 8 LOGARITHMIC PLOTTING OF PRESSURE DROP VERSUS VELOCITY FOR A WATER TEMPERATURE OF 85 DEG. FAHR.

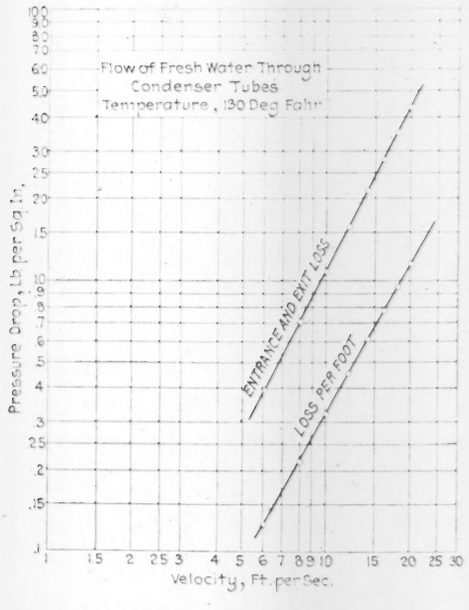

FIG. 9 LOGARITHMIC PLOTTING OF PRESSURE DROP VERSUS VELOCITY FOR A WATER TEMPERATURE OF 130 DEG. FAHR.

For clean condenser tubes, standard $\frac{5}{8}$ in. outside diameter, No. 18 gage 0.0345 in. thick, and for an average water temperature of 90 deg. fahr., we may write

$$P = 0.0118\ V^2 + 0.0051\ LV^{1.83}$$

where P is the total loss in pounds per square inch; V is the velocity in feet per second; and L is the tube length in feet. With very dirty tubes the entrance and exit losses would undoubtedly be unchanged, but the loss per foot would be greater. Assuming the latter to be increased 20 per cent for condenser tubes in the ordinary condition, for standard $\frac{5}{8}$-in. diameter tubes No. 18 gage we may write —

$$P = 0.0118\ V^2 + 0.0061\ LV^{1.83}$$

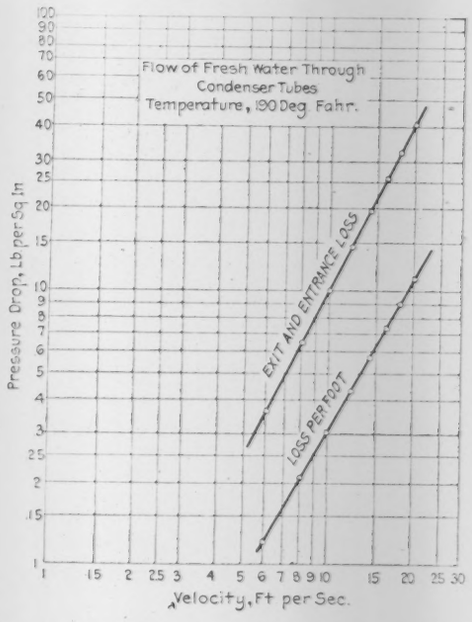

FIG. 10 LOGARITHMIC PLOTTING OF PRESSURE DROP VERSUS VELOCITY FOR A WATER TEMPERATURE OF 190 DEG. FAHR.

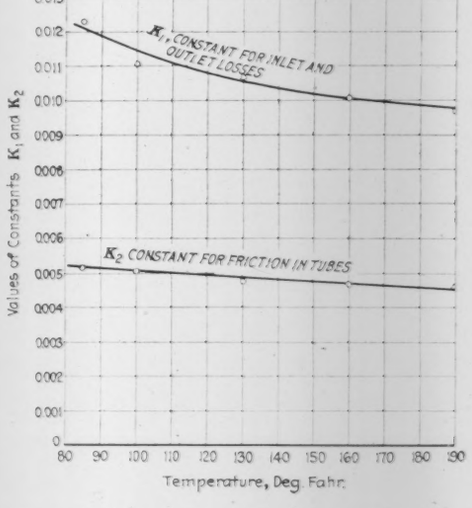

FIG. 11 CURVES SHOWING THE RELATION OF CONSTANTS TO THE TEMPERATURE OF WATER

Expressing the resistance in feet head of water, we have

$$H = 0.0274\ V^2 + 0.0141\ LV^{1.83}.$$

Pamphlets of instructions to enumerators for the fourteenth census have been sent to the 80,000 people engaged in this work. These instructions cover a special classification of technical engineers so that the returns will permit of their accurate enumeration. Special agents under the immediate direction of the Washington Census Bureau officials are in charge of the census of mines, quarries, forestry and manufactures.

ENGINEERING RESEARCH

A Department Conducted by the Research Committee of the A. S. M. E.

Research Problems

The attention of readers of MECHANICAL ENGINEERING is directed to two research problems proposed by the Bureau of Ordnance of the United States Navy. These problems are of a research nature in machine design, and the satisfactory solution of them would be of value for naval use.

Bibliography

The attention of the members of the Society is called to the Book Review Index published by the Carnegie Library of Pittsburgh, and also to the bibliographies which are published by the Library. The Director of the Library has consented to furnish the Research Committee with information regarding the work of the Library, and the Committee plans to transmit this information to the members through MECHANICAL ENGINEERING.

Correction

Referring to *Apparatus and Instruments A14-19* on page 890 of the November issue of MECHANICAL ENGINEERING, the Bulletin from the Bureau of Standards stated that the change in gages after a few months was from 2 to 6 one-thousandths of an inch. This should have been from 2 to 6 hundred-thousandths of an inch.

A — RESEARCH RESULTS

The purpose of this section of Engineering Research is to state the origin of research information which has been completed, to give a résumé of research results with formulæ or curves where such may be readily given, and to report results of non-extensive researches which in the opinion of the investigator do not warrant a paper.

Cement and Other Building Materials A11-19 Effects of Cal and Calcium Chloride on the Strength of Concrete. Calcium chloride is more effective than cal as an accelerator of the hardening of concrete. The effect varies with the concentration of the accelerator, the cement and the conditions of storage. There is some difference in the action of these during two or three days. The strength of treated concrete is invariably higher than that of the untreated. Bureau of Standards, Washington, D. C. Address S. W. Stratton, Director.

Cement and Other Building Materials A12-19 Cement Drain Tiles and Alkali Soils. The Bureau of Standards, in continuing its work on cement drain tile and alkali soils, has found that there has been little change in the concrete blocks buried in alkali soil which were last inspected in 1916. Tiles which were then in good condition are in the same condition, and the same is true for the concrete blocks. Bureau of Standards, Washington, D. C. Address S. W. Stratton, Director.

Electric Power A5-19 Corrosion of Cables. An investigation by the Bureau of Standards regarding the corrosion of power cables in St. Louis has shown that the corrosion was caused by electrolysis which occurred several years ago during the first few months after the cables were installed. The investigation has resulted in no saving to the company, but has demonstrated the importance of prompt attention to possible electrolysis. Bureau of Standards, Washington, D. C. Address S. W. Stratton, Director.

Fire Protection A1-19 Gases Produced from Smoldering Fires in Small Chambers. A number of smoldering fires were built in the gas chamber of the Pittsburgh Station of the Bureau of Mines to show that it was possible to build up a concentration of 1 per cent of carbon monoxide in four hours. A quick smoldering fire or smoke seldom contains more than 1 per cent of carbon monoxide. Army gas masks remove irritating tar particles but do not remove the carbon monoxide. Bureau of Mines, Washington, D. C. Address Van H. Manning, Director.

Heat A3-19 Vapor Pressure of Lead Chloride. A complete table of vapor pressures and report on the investigation by L. E. Duschak and E. D. Eastman of the Bureau of Mines Station at Berkeley, Cal., is being printed. Bureau of Mines, Washington, D. C. Address Van H. Manning, Director.

Lubricants A1-19 Blending of Viscosity. The Bureau of Standards has prepared a diagram which corresponds with formulæ and experiments for the purpose of obtaining a certain viscosity from two oils of known viscosity. The viscosities are expressed in seconds as determined by the Saybolt viscosimeter. Bureau of Standards, Washington, D. C. Address S. W. Stratton, Director.

Properties of Engineering Materials A6-19 Specific Gravity of Wood. The Forest Products Laboratory has issued No. B-14 of its Technical Notes relating to the method of determining the specific gravity of timber by selecting chips from a boring or from a representative specimen of the wood. A specimen should not contain more than 25 cu. in. Forest Products Laboratory, Madison, Wis. Address C. P. Winslow, Director.

Wood Products A10-19 Waste Liquid Sulphur Dioxide from Smelters for the Manufacture of Sulphite Acid. The Forest Products Laboratory suggests the use of liquid sulphur dioxide from the stack gases of smelters for the manufacture of sulphite acid. When the freight charges on shipment permit this, it is advisable to utilize the waste gases. Forest Products Laboratory, Madison, Wis. Address C. P. Winslow, Director.

Wood Products A11-19 Moisture Resistance Tests for Coatings. In testing the water resistance of coated material it was found that for a 17-day exposure a humid atmosphere of 95 to 100 per cent humidity gave equal absorption with that obtained by immersing the specimen in water. Forest Products Laboratory, Madison, Wis. Address C. P. Winslow, Director.

B—RESEARCH IN PROGRESS

The purpose of this section of Engineering Research is to bring together those who are working on the same problem for coöperation or conference, to prevent unnecessary duplication of work and to inform the profession of the investigators who are engaged upon research problems. The addresses of these investigators are given for the purpose of correspondence.

Cement and Other Building Materials B12-19 Reinforced-Concrete Floor Slabs. The Bureau of Standards has started an investigation on large flat slabs used in the floors of a new building for a manufacturing plant in Ohio. The slab is reinforced in the two-way system of reinforcement with hollow tile at certain intervals. Bureau of Standards, Washington, D. C. Address S. W. Stratton, Director.

Fire Prevention B1-19 Gases Produced from Carbon-Tetrachloride Fire Extinguishers. At the Pittsburgh Station of the Bureau of Mines an investigation is being made of the composition of gases from fire extinguishers using carbon tetrachloride together with the use of gas masks for protection against these vapors. Several men were recently overcome and subsequently died from inhaling such gases in a restricted place in a submarine. The investigation is under the direction of A. C. Fieldner and S. H. Katz. Bureau of Mines, Washington, D. C. Address Van H. Manning, Director.

Fuels, Gas, Tar and Coke B6-19 Economic Use of Fuels. The Bureau of Mines is investigating this subject at Pittsburgh under the direction of Henry Kreisinger. The work includes the use of fuels in steam boilers and furnaces, the use of powdered coal, the use of fuel in refining oils, the subject of heat transmission and the study of combustion in underfeed stokers. Bureau of Mines, Washington, D. C. Address Van H. Manning, Director.

Fuels, Gas, Tar and Coke B7-19 Solid Fuels. The Bureau of Mines is investigating the utilization of coals of the Northwest at the Station at Seattle under the direction of F. K. Ovitz. This work will include the use of powdered coal and the storage of coal. Bureau of Mines, Washington, D. C. Address Van H. Manning, Director.

Fuels, Gas, Tar and Coke B8-19 Lignite. Work is being conducted at the Station of the Bureau of Mines at Fairbanks, Alaska, by John A. Davis on the preparation of lignite for market, and the use of this under boilers. A survey is being made of the power requirements for the interior of Alaska. Bureau of Mines, Washington, D. C. Address Van H. Manning, Director.

Metallurgy and Metallography B14-19 Graphite for Crucible Use. The Bureau of Mines is studying the preparation of graphite for crucible use at the station at Salt Lake City under the direction of F. G. Moses. Bureau of Mines, Washington, D. C. Address Van H. Manning, Director.

Metallurgy and Metallography B15-19 Flotation. The Bureau of Mines is investigating flotation at the Station at Salt Lake City under O. C. Ralston and at the Station at Seattle under W. H. Coghill. At both of these stations flotation oils are being investigated. Bureau of Mines, Washington, D. C. Address Van H. Manning, Director.

Paints, Varnishes and Resins B1-19 Luminous Paint. The Bureau of Mines through R. B. Moore, S. H. Schlundt, S. C. Lind, J. E. Underwood and C. W. Davis is investigating the cause of luminosity in radium luminous paints, and the reasons for changes in luminosity after the radium and zinc sulphide are mixed together. Bureau of Mines, Washington, D. C. Address Van H. Manning, Director.

Wood Products B3-19 Deterioration of Paper in Storage. The Bureau of Standards is testing a large number of samples of paper. Samples were tested in 1909. The results of these tests are to be compared with the tests of today. The rosin content seems to have increased 20 per cent and the strength has decreased 27 per cent. These results may be due to the change in method of making the tests. Bureau of Standards, Washington, D. C. Address S. W. Stratton, Director.

C—Research Problems

The purpose of this section of Engineering Research is to bring together persons who desire coöperation in research work or to bring together those who have problems and no equipment with those who are equipped to carry on research. It is hoped that those desiring coöperation or aid will state problems for publication in this section.

Apparatus and Instruments C14-19 Contraction of Sylphons with Aging. The sylphon is a corrugated tube of thin metal used as a combined spring and air container in various hydrostatically operated mechanisms. It is made at present by the Fulton Company, of Knoxville, Tenn. At present the sylphons vary in their free length with aging while retaining the same elasticity. As a result they operate at a different pressure from that intended. They usually decrease in length. It is desired, if possible, to obtain an equivalent mechanical device not subject to this defect. The requirements are as follows:

The device to be entirely of metal
The device to resist corrosion and damp air especially at sea
To be easy to assemble
To be capable of test for precision of operation without change of quality
To permit a maximum contraction of 25 per cent in length without permanent set.

Bureau of Ordnance, U. S. Navy, Washington, D. C. Address Chief of Bureau, Rear-Admiral Ralph Earle.

Apparatus and Instruments C15-19 Clamp for Wire Rope. Certain Ordnance equipment requires that pure copper wire rope be clamped without the use of any other metal than copper to a fitting by which it can be shackled or hooked to other parts. This joint is subject to continual bending of small amount, due to water motion, and joints so far constructed show failures just outside the clamp employed, due to the fact that the clamping and the stress produced by bending is not well distributed. It is required to have a clamp to meet the following specifications:

To contain no other metal than copper.
To permit clamping wire rope between ¼ in. and ½ in. nominal diameter
To be easy of assembly
To resist in the best manner continual bending in any plane to an amount not exceeding 15 deg.
To have an ultimate tensile strength of not less than 50 per cent of the rope used.

Bureau of Ordnance, U. S. Navy, Washington, D. C. Address Chief of Bureau, Rear-Admiral Ralph Earle.

D—Research Equipment

The purpose of this section of Engineering Research is to give in concise form notes regarding the equipment of laboratories for mutual information and for the purpose of informing the profession of the equipment in various laboratories so that persons desiring special investigations may know where such work may be done.

University of Maine D1-19 Equipment of Mechanical Engineering Laboratory::

Five 150-hp. h.r.t. boilers
One 10 x 30-in. Hamilton-Corliss engine with Alden dynamometer
One Ford automobile engine
One six-cylinder Pierce-Arrow automobile engine
One 8 x 10-in. Fairbanks-Morse gasoline engine
One 2-cycle Knox marine engine, two cylinders 4½ x 4½, kerosene carburetor
One 4 by 6-in. Dean double-acting triplex pump
One 6-in. weir with 2-in. venturi meter and weighing tanks
One 170-sq. ft. Worthington condenser
One 7-kw. G. E. turbo-generator
One Junker calorimeter
One Olsen oil-testing machine
One 60,000-lb. Riehlé testing machine
One 150,000-lb. Riehlé testing machine
One 14,400-inch-pound Swiss torsion machine
One 2000-lb. beam testing machine
One 5-in. No. 3 Sturtevant blower.

F—Bibliographies

The purpose of this section of Engineering Research is to inform the profession and especially the members of the A.S.M.E. of bibliographies which have been prepared. These bibliographies have been prepared at the request of members, and where the bibliography is not extensive, this is done at the expense of the Society. For bibliographies of a general nature the Society is prepared to make extensive bibliographies at the expense of the Society on the approval of the Research Committee. After these bibliographies are prepared they are loaned to the person requesting them for a period of one month. Additional copies are prepared which are available for periods of two weeks to members of the A.S.M.E. or to others recommended by members of the A.S.M.E. These bibliographies are on file in the offices of the Society and are to be loaned on request. The bibliographies are prepared by the staff of the Library of the United Engineering Society, which is probably the largest engineering library in this country.

Fuels, Gas, Tar and Coke F6-19 By-Product Coking. A very complete bibliography on by-product coking theory and practice with discussion of by-products. A pamphlet of 40 pages. Price 5 cents. Address Director, Pittsburgh Carnegie Library, Pittsburgh, Pa.

Economics F4-19 Market Prices. A list of journals giving market prices listed under various industries. A six-page pamphlet published by the Pittsburgh Carnegie Library. Address Director, Pittsburgh Carnegie Library, Pittsburgh, Pa.

Mechanics, General F1-19 The Gyroscope. A bibliography of theory and application of the gyroscope to aeroplanes, monorail cars, marine navigation for stabilizing and compass. A bibliography of 23 pages published by the Pittsburgh Carnegie Library. Address Director, Pittsburgh Carnegie Library, Pittsburgh, Pa.

Paints, Varnishes and Resins F1-19 Lampblack. A bibliography of 8 pages giving books, magazine articles and patents relative to lampblack. Published by the Carnegie Library of Pittsburgh. Address Director, Carnegie Library of Pittsburgh, Pittsburgh, Pa

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A unique educational project has been developed at Spartanburg, S. C., in connection with The Textile Industrial Institute of that place. Eighteen months ago it was decided to build a modern mill for instruction purposes if funds could be raised sufficient to carry through the undertaking. Generous subscriptions were secured of cash, materials and machinery, work was begun, and the main building is now nearly completed, of reinforced concrete, most modern in design and equipment. In fact it is said that in its appointments this will actually be the finest mill in the world.

Students will operate the mill. The superintendent, overseers, as well as all the operatives, will attend The Textile Institute and will manufacture a line of high-grade cotton cloth to be known as "Character Cloth" and sold direct to consumers by parcel post.

Every student in the mill will be given special training in the class room so that he will understand the theory of the process upon which he is engaged. It is also expected that he will be self-supporting by working every other week in the mill, for which he will receive pay sufficient to cover his expenses for two weeks. At first there will be two separate student organizations having a superintendent, corps of overseers, section hands, loom fixers and operatives. Later, as the work becomes organized, it may be possible to employ more than two shifts of students and thus run the plant at the highest possible teaching efficiency.

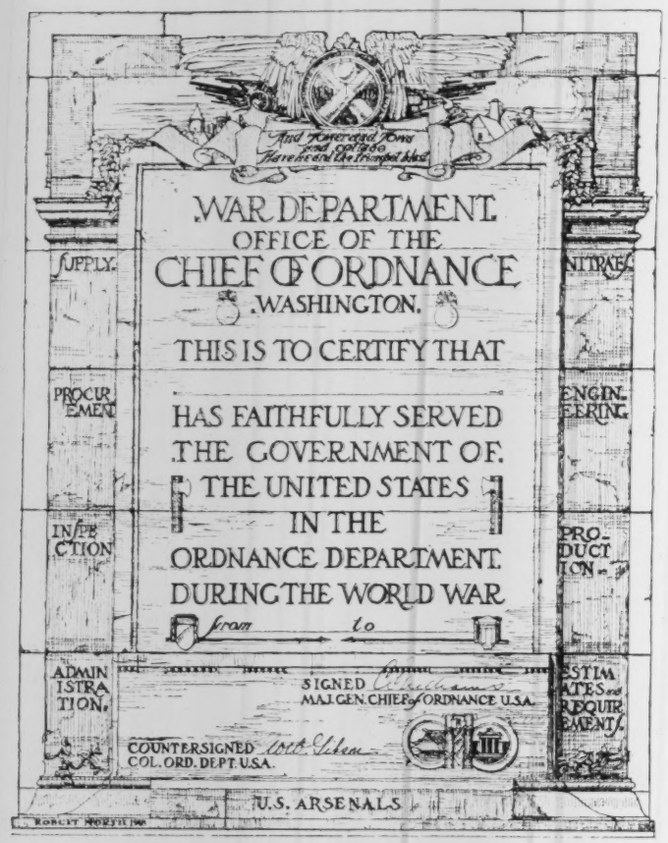
CORRESPONDENCE

CONTRIBUTIONS to the Correspondence Departments of MECHANICAL ENGINEERING by members of The American Society of Mechanical Engineers are solicited by the Publication Committee. Contributions particularly welcomed are suggestions on Society Affairs, discussions of papers published in this journal, or brief articles of current interest to mechanical engineers.

Certificates for Engineers in War Service in the United States

TO THE EDITOR:

In the September 1919 issue of MECHANICAL ENGINEERING, attention was called by Mr. Donald A. Hampson to the fact that one of the most highly-prized possessions of the returned soldier is his discharge paper. For many years the soldier who was at the front will exhibit this paper with pride and long after his friends have forgotten his record of war service his discharge will stand as evidence of the deeds which he performed. Mr. Hampson also suggested that as "it was the rounding up of the country's resources of engineering that was largely responsible for the



CERTIFICATE ISSUED BY ORDNANCE DEPARTMENT, U. S. A., IN RECOGNITION OF HOME SERVICE

'year earlier than expected' result," the Government provide "some tangible mark or document" in recognition of the service rendered during the war by those engineers engaged in work here in the United States.

Such a document is obtainable upon request, at least from the Ordnance Department, and possibly from the other branches as well. The writer served about five months at Frankford Arsenal Gage Department and was then sent to the Engineering Division at Washington for work on the standardization of gages, serving one year and eight months in all. He received a certificate on which was indicated the two departments mentioned. There may be other engineers desirous of this memento; if so, they should address their former personnel officer.

There was also a pin purchasable after three months' service, a bronze bar after six months, a red bar after a year, a red and a bronze bar after eighteen months, etc.

H. S. KARTSHER.

Cleveland, Ohio.

[The Ordnance Department has issued a Procedure for Distribution of Certificates of Faithful Service which states, in part, that " a certificate of faithful service may be issued to each employee of the Ordnance Department during the war, on request, when separated from the Ordnance Department without prejudice on or after November 11, 1918," and that "any employee entitled to a certificate may, on request, have a certificate mailed to him or her bearing the dates showing the period of service in the Ordnance Department during the World War."—EDITOR.]

The Usual Misleading and the Correct Statement of Averages

TO THE EDITOR:

Ask anyone for a definition of an "average" and how to arrive at such average. Ninety out of a hundred will answer in accord with the Century Dictionary:

"Average: A sum or quantity intermediate to a number of different sums or quantities, obtained by adding them together and dividing the result by the number of quantities added; an arithmetical mean. Thus, if four persons lose respectively $10, $20, $30 and $40, the *average* loss of the four is $25."

And this definition is correct so far as it goes, but it does not go far enough and therefore is frequently distinctly misleading. Yet the great majority of people and engineers who deal with averages are content with this incomplete definition and fail to realize how absolutely misleading it may be and frequently is. A few simple examples will make this clear:

I. What is the average of $2 + 3 + 4$?

The usual answer is $\frac{2+3+4}{3} = \frac{9}{3} = 3$

II. And similarly the average of $1 + 3 + 5 = 3$.

III. And the average of $3 + 3 + 3 = 3$.

IV. Again the average of $2 + 2 + 5 = 3$.

Here are four different series all having the same apparent average of 3.

The error lies in the disregard of the amount by which the average differs from the original values. The true average should include that and for the four examples is:

I. 3 Plus or minus 1
II. 3 plus or minus 2
III. 3 plus or minus 0
IV. 3 plus 2 or minus 1

When the average is so expressed it is at once clear that in I. the terminal values of the series are 2 and 4, in II. are 1 and 5, in III. are 3 and 3, and in IV. are 2 and 5.

Certainly it is not a matter of indifference, but may be a matter of decided importance to know whether maximum and minimum values of a series differ much or little from one another.

The importance will be clear from the following illustration taken from the writer's experience in the domain of mechanical engineering.

Occasion arose casting doubt on the uniformity of the strength of balls of a well-known and highly-regarded make. On voicing that doubt to the manufacturer the writer was assured that carefully conducted tests on a considerable quantity of balls showed marked uniformity within a relatively few points.

A request for the log of these tests disclosed the explanation and showed that the claim was made in perfectly good faith, but was nevertheless made in error; the averages took into account only the first number or ordinary average, whereas the second or + and — number of the correct average had not been considered.

The log follows: Breaking loads of three series of balls of equal diameter are —

a	*b*	*c*
62,500	76,000	93,500
68,000	84,500	63,000
72,000	86,000	74,000
94,000	91,000	69,000
83,000	75,500	71,500
379,500	413,000	371,000
Average 75,900	82,600	74,200

This log, when the usual averages only were considered, showed a not very serious difference.

But had the correct method of stating the averages been used, then these would have been shown as

a 75,900 $^{-\ 13,400}_{+\ 18,100}$ *b* 82,600 $^{-\ 7,400}_{+\ 8,400}$ *c* 74,200 $^{-\ 11,200}_{+\ 19,300}$

These three complete averages are fully representative of the entire series of tests, while the incomplete or ordinary averages give no clue whatsoever as to the seriousness of divergencies from the average.

a The ordinary average or 75,900 gave no clue as to whether this was an average of 75,901 and 75,899 with a difference of only 1 point + or —, whereas the actual difference between the numbers of the series was much more important, amounting to 13,400 — and 18,100 +.

It is thus clear that these full or complete averages do convey full information. Had these complete averages been used their use would, in all probability, have avoided the unintentional giving of misleading information.

This misleading use of the term average is so general that it invades even such standard works as our engineering pocketbooks.

Thus Suplee gives the compression in pounds per square inch of granite as averaging 15,000 lb. and for four different varieties gives 12,000, 15,000, 16,000 and 15,000 lb. The average of these four varieties is 14,500 $^{-\ 2,500}_{+\ 1,500}$.

Assuming that all granites lie between the limits of the four cited, the complete average stated gives safe data.

Suplee further gives the average for slate as 10,000 lb., but quotes no varieties; yet it is certain that some slates are stronger and some weaker than others. What is their safe value? The completion of the average by the second term of $\frac{-}{+}$ would give the necessary information.

Similarly it is certain that some steel castings have higher elastic limits than the 40,000 lb. per sq. in. that Suplee quotes as average; but how much less or how much more is left to the reader's imagination. A complete statement of the average would here again substitute definite information for guesswork.

These few examples taken at random prove the need of a more complete definition, which, following the Century, would be:

"Average is that quantity intermediate a number of different quantities obtained by adding together these quantities, dividing the result by the number of quantities that were added, supplemented by a statement of the quantities by which the result differs from the largest and the smallest of the quantities. Thus, if four persons lose respectively $10, $20, $30 and $60, the average loss is $30 $^{-\ \$20}_{+\ \$30}$."

HENRY HESS.

Philadelphia, Pa.

Present-Day Problems Discussed by E. W. Rice, Jr.

In an address at the opening meeting in Schenectady of the recently organized Eastern New York Section of the A.S.M.E., Mr. E. W. Rice, Jr., president of the General Electric Company, urged engineers to give more attention to economic problems and emphasized the importance of increased production and simple living as a means of offsetting the difficulties of today. He said in part:

Engineers have been so busy increasing the productivity of man that they have not noticed that many people, who have profited thereby, have been equally busy in an effort to decrease the productiveness. Engineers are workers, not talkers, and have been inclined to ignore the talkers who were not workers.

This attitude was fairly safe as long as the talkers had no influence on the result. The situation has changed greatly during the last few years. Millions of producers were taken out of production to form armies and navies and to take care of their supply and maintenance. Besides the loss of the production of useful goods, there was, of course, added the tremendous destruction and wastes of war. In view of such a situation, what action should be taken by the engineer?

With his training and record, he would, of course, bend every energy to replace the destroyed goods and increase the output of the world's farms, factories and mines; he would improve the methods of transportation, not only to meet the current demands, but to make up for the losses of the last five years. This country and the whole world needs to produce greater quantities of every useful thing more than ever before in its history. Most people who think clearly and without passion and prejudice agree with the engineers on this subject, but there are others, unfortunately, who act as if they did not see the world's need, or seeing it, did not care. They demand shorter hours, although this means loss of production, and they strike, thus actually stopping production altogether for a time to enforce their demands for lessened production.

What would you think of an engineer who deliberately designed machinery to produce fewer articles rather than more, who instead of trying to increase his usefulness and service to the world, made every effort to reduce the value of his contribution? I imagine that we would pity him and the verdict would be that he had lost his mind. Now it is difficult to believe that these masses of men, of which I speak, are all crazy or wicked, and therefore the problem to be solved is to find out what is the matter with them.

I suggest as possibly the most reasonable answer that they are ignorant of the fundamental economic facts and principles. They really do not know what they are doing. The essential principles of economics are not difficult to ascertain or to understand. I think we all wish to get at the truth. The problems of today are created by a lack of understanding and appreciation of the great principles of economics which are built upon the experience of men during the long evolution upward from savagery and barbarism.

I am anxious to see engineers devote more time to the study of economic facts and principles. I feel sure that if they approach this investigation in the same spirit and use the same methods that they employ in solving mechanical problems, they will arrive at a satisfactory solution.

The high cost of living is one of our basic present-day problems. The ultimate solution from the standpoint of an engineer would seem to be increased production so that the world may have an abundance of the things which are needed or desired. Until this increased production has been obtained and a bountiful supply of goods realized, it would seem to be our duty to restrict our desires and demands as much as possible and to make the same sacrifices which were so cheerfully made during the war. It has been suggested that the present high cost of living is aggravated and increased by the extravagance of the great majority of people — rich and poor.

The engineer will readily appreciate that if such extravagance is limited to a few, the effect on the high cost of living will be negligible, while if indulged in by many, it will be most serious.

ENGINEERING SURVEY

A Review of Progress and Attainment in Mechanical Engineering and Related Fields, as Gathered from Current Technical Periodicals and Other Sources

SUBJECTS OF THIS MONTH'S ABSTRACTS

BLOWERS FOR AERO ENGINES
COPPER DIFFUSION THROUGH CAST IRON
ORIFICE AS MEANS OF MEASURING WATER FLOW THROUGH PIPE
CENTRIFUGAL MACHINERY, ENERGY LOSSES
NICKEL SPARK-PLUG TERMINALS, DETERIORATION
BRITISH STATIONARY DIESEL ENGINES
BRAKE-HORSEPOWER FORMULA FOR INTERNAL-COMBUSTION ENGINES
COMBUSTION-ENGINE DESIGN FOR POORER FUELS
EQUATION OF THE INVOLUTE
WEDGE BOLT
TOOTH GEARING, MANUFACTURE AND DESIGN
STANDARDIZATION OF SPINDLE NOSES FOR MILLING MACHINES IN GREAT BRITAIN
TORPEDO-BOAT DESTROYERS, TURBINE-GEAR DRIVE
OCCLUSION OF GASES BY METALS
AIR LEAKAGE AND SURFACE-CONDENSER DESIGN
GASOLINE VS. ELECTRIC MOTORS
FLOW OF STEAM THROUGH PIPES
TIN FUSIBLE BOILER PLUGS
EQUILIBRIUM CONDITIONS IN SATURATED AND UNDERCOOLED STEAM

AIR MACHINERY

BLOWERS FOR AERO ENGINES, W. G. Noack. Description of blowers built in Germany for use in supercharging aircraft engines at high altitudes.

The blowers are of the centrifugal type. Three or four stages are directly driven off the engine shaft, suitable provision being made to prevent torsional oscillation. The delivery is regulated by throttling the air intake of the blower. The carburetor has to be compensated for variations of air pressure in the usual manner. The speed of rotation is very high—10,000 to 11,000 r.p.m., and special steels are used for the rotors. The weight of a blower complete with fittings suitable for an engine 260 hp. and capable of reproducing ground-level conditions up to 15,000 ft. is 125 lb. The power consumed is about 25 hp. (*Flugsport*, Sept. 19, 1919, abstracted through *The Technical Review*, vol. 5, no. 48, Oct. 28, 1919, p. 82, *d*)

ENGINEERING MATERIALS (See Metallurgy and Ignition Apparatus)

HEAT TREATING

COPPER DIFFUSION THROUGH CAST IRON, H. E. Diller. When a malleable-iron bar packed in copper oxide packing and annealed at 1000 deg. cent. was taken from the furnace it was found that the copper oxide was reduced to metallic copper, which latter was melted and penetrated into the iron. An average sample of

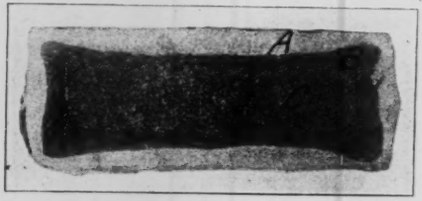


FIG. 1 CROSS SECTION OF GRAY-IRON BAR ANNEALED IN COPPER OXIDE PACKING

the bar showed that the carbon had been reduced from 2.70 to 0.60 per cent and that there was 21.4 per cent copper.

The test showed for this bar a strength of 68,200 lb. per sq. in. and an elongation of 1 per cent in 2 in. The electrical conductivity of the metal was not materially increased by the presence of the copper.

In other tests the test pieces were packed in black copper oxide and heated to about 900 deg. cent. The results were different and a far smaller penetration of copper was observed.

With gray iron quite different results from those for malleable iron were obtained. This is illustrated in Fig. 1, which shows a cross-section of one of the bars. Three distinct areas can be seen. The area *A* contains all of the copper. There is a thin layer of copper on the outside and next to this the copper is very finely divided and is in the form of droplike areas surrounded by a

FIG. 2 DIVIDING LINE BETWEEN *A* AND *B*, FIG. 1

FIG. 3 STRUCTURE OF *B* AND *C*, FIG. 1

matrix of iron. This matrix has a peculiar structure and is more like steel than it is like gray iron. The line between *A* and *B* Fig. 1, is shown in Fig. 2. The dark area is the portion containing the copper. The light portion in the same figure represents

the structure of the section marked *B* in Fig. 1. The same structure is seen in the upper section of Fig. 3, which is part of the dividing line between areas *B* and *C*. This structure is almost like the structure of malleable iron in its appearance under the microscope, but scattered through it can occasionally be seen flakes of graphite.

The center of the bar *C*, Fig. 1, has the structure of unchanged gray iron. This is shown in the lower section of Fig. 3. (*The Foundry*, vol. 47, no. 334, November 1, 1919, pp. 779-780, 6 figs., *e*)

HYDRAULIC ENGINEERING

Orifice Measurement of Water-Pipe Discharge

THE ORIFICE AS A MEANS OF MEASURING FLOW OF WATER THROUGH A PIPE, Raymond E. Davis and Harvey H. Jordan. The thin-plate orifice may be used with confidence for measuring the discharge of water through pipes. Like nearly all methods, it is subject to some limitations, although it helps to fill a growing need which has been partly filled by the pitometer and by the injection of chemicals. The pipe orifice is in effect a portable venturi meter, the disadvantage of the pipe orifice being the relatively large lost head caused by the obstruction of the orifice plate; however since the pipe orifice method is probably best adapted to temporary use the lost head may in general be unimportant. In a long pipe line also the lost head caused by the orifice would be relatively small. Cases in which the pipe orifice should be of particular value have already been suggested in the introduction.

Although all the deductions and conclusions given in this summary apply to the measurement of water, attention should be called to the fact that the pipe orifice is adapted to measuring the discharge of air, gas, and steam through pipes.

The following points are important as a guide to the proper use of the pipe orifice method of measuring the discharge of water through a pipe:

1 The two sections of the pipe between which change in pressure head may be most reliably determined are the section at which normal flow is discontinued and the stream begins to converge as it approaches the orifice, and the section of greatest contraction of the jet after it leaves the orifice. Regardless of the size of pipe, for all sizes of orifice which it is feasible to use, the distance from the plane of the orifice to the section of beginning of convergence may be taken as eight-tenths the pipe diameter, and the distance of the section of greatest contraction as four-tenths the pipe diameter.

2 The drop in pressure head between these two sections is greater than that to be found for any other two sections near the orifice.

3 Having given the measured difference between the pressure head at the section of beginning of convergence and the pressure head at the section of greatest contraction the discharge may be determined through the use of one of two equations given in the original paper. (In one of these equations there is used a coefficient of discharge which is a variable quantity.) It decreases as the size of pipe increases; it decreases slightly as the drop in pressure head increases; it has a minimum value for orifices having a diameter of one-third that of the pipe and increases as the diameter of the orifice becomes greater or becomes less than one-third the diameter of the pipe.

4 The lost head caused by any given orifice in the pipe in terms of the velocity in the pipe may be determined by an equation given in the original paper, and is always less than the drop in pressure head between the section of beginning of convergence and the section of greatest contraction, but approaches it in value as the ratio of the diameter of the pipe to the diameter of the orifice (D/d) increases.

5 Due to the fluctuations of the liquid in the gage tubes the systematic error of reading the gage increases as the ratio of the diameter of the pipe to that of the orifice decreases, but when that ratio (D/d) is 2 or greater the error may under normal conditions of flow be reduced to a negligible quantity by a proper manipulation of apparatus. As (D/d) becomes less than 2 the accidental error of reading the gage increases very rapidly, and also small errors in the measurement of the diameter of the pipe or the diameter of the orifice are likely to be the constant sources of an error of increasing magnitude in the computed discharge. The indications are that, for favorable conditions of flow and with care in installing the apparatus and in observing, discharge may be determined generally within 2 per cent when the diameter of the orifice is not in excess of two-thirds that of the pipe, but this size of orifice seems to be about the maximum that can be used except for approximate determinations of discharge. When the magnitude of the lost head is not the controlling factor in the choice of size of orifice, best results are likely to be obtained if the diameter of the orifice is not greater than one-half that of the pipe.

6 For orifices having a diameter greater than one-half that of the pipe the use of two opposite pressure openings at each section is important because of the probability of the orifice being somewhat eccentric with the pipe, unless greater care is taken in placing the orifice than will usually be found practicable. Systematic errors of observing may be greatly reduced by proper throttling.

7 The coefficient of discharge for bevel-edged orifices is a much more variable quantity and is materially greater than the coefficiency of discharge for thin square-edged orifices. The use of the bevel-edged orifice seems not to be practicable, except for approximate measurements when the orifice diameter is greater than two-thirds of the pipe diameter. (*The University of Illinois Bulletin*, vol. 16, no. 14, Dec. 2, 1919, 52 pp., 14 figs., 7 tables, *tpA*)

HYDRAULIC MACHINERY

DETERMINATION OF ENERGY LOSSES IN CENTRIFUGAL MACHINERY ON THE BASIS OF THEIR CHARACTERISTIC CURVES, R. Muller, Dr. of Engrg. Data of an investigation having reference to centrifugal machinery in which a liquid or gaseous material of substantially constant density flows through one or more centrifugal wheels having full admission. The problem under consideration is to determine the energy losses occurring in the machinery, to separate them into their main components and to express their functional relation to known magnitudes by means of constant or variable coefficients. It is assumed that there are available constructional and blade drawings of the machine, data of tests and characteristic curves.

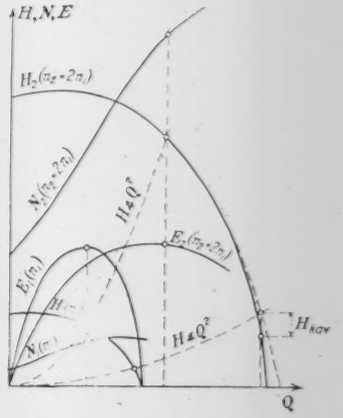


FIG. 4 CHARACTERISTIC CURVES OF A CENTRIFUGAL PUMP WITH CONSTANT SPEED OF ROTATION IN REVOLUTIONS n_1 AND $n_2 = 2n_1$

These characteristic curves are given for a centrifugal pump in Fig. 4 and show the output demand N, delivery head H, and efficiency E as a function of the amount of water Q delivered in one second at constant speed in revolutions n (or $2n$) of the pump wheel.

The article itself is of a mathematical character not suitable for abstracting under the present conditions of publication of the Journal. The whole calculation is based on the assumption that the known deviations of the actual flow through the turbine wheel as compared with what they should be in accordance with the Euler theory may be credited to secondary phenomena of flow within the wheel itself. As far as possible at the present time proper loss coefficients are used in the computation of the various components of the total loss, these loss coefficients being derived partly from the estimation of the characteristic curves and partly by direct experimentation. As regards these latter, references are given to technical literature where data as to their value may be found. (Beurteilung des Energieverlustes von Kreiselradmaschinen auf Grund ihrer Kennlinien, R. Mueller, *Zeitschrift des Vereines deutscher Ingenieure,* vol. 63, no. 26, June 28, 1919, pp. 601-607, 12 figs., *t*)

IGNITION APPARATUS

Nickel Spark-Plug Terminals Deteriorate through Excessive Local Heating

DETERIORATION OF NICKEL SPARK-PLUG TERMINALS IN SERVICE, Henry S. Rawdon and A. I. Krynitzky. The most commonly used material for terminals in spark plugs is commercial nickel wire containing about 97 per cent nickel, the remainder being manganese, cobalt, iron, copper and minor impurities. The peculiar type of deterioration that occurs in these nickel terminals during the service life of the spark plug was recently brought to the attention of the Bureau of Standards, the present paper giving the main results of the investigation.

It has been found that the deterioration of the central terminal was quite negligible compared to that of the side terminal or terminals. These latter wires had developed, in service, transverse cracks that in many cases were as sharp and definite as a knife cut. After a separation occurred the bridge widened by loss of material from ends of the fractured wires until a gap of as much as one centimeter often resulted. The fragments of the deteriorated wire terminals removed from the spark plugs were found on the whole to be rather ductile and stand several sharp right-angle bends before breaking. The extreme end portion immediately adjacent to the break, however, was brittle and broke readily when an attempt was made to bend it.

The examination of the central terminal showed that a change of the same character as occurred in side terminals had taken place in this one also, but to a far less extent.

The tests would indicate that variations in chemical composition such as occur in commercial nickel wire are not a determining factor in the deterioration of the wire in service. Terminals of nickel of relatively high purity were found to be attacked in the same manner as others of lower nickel content. Oxidation of the nickel does not appear as being of great importance in this connection, and the action of hot reducing gases, though somewhat greater than that of oxidizing, does not appear to be very great either.

It would appear that the main cause of embrittlement of the wire lies in the intense local heating by means of the electric spark, together with the sudden cooling, and that once the formation of transverse intercrystalline cracks has started the application of a relatively low stress to the hot wire is sufficient to fracture the wire. *(Bulletin of the American Institute of Mining and Metallurgical Engineers,* no. 152, August 1919, pp. 1323-1350, 21 figs., *e)*

INTERNAL-COMBUSTION ENGINEERING

British Improvements in Diesel Engines

BRITISH STATIONARY DIESEL ENGINES OF TODAY. Brief notes on various improvements introduced by British manufacturers in the last five or six years.

Mirrlees, Bickerton & Day have introduced in their engines a pilot jet of kerosene to form a flame for the ignition of a varying jet of tar oil, which enables this difficult form of fuel to be used successfully at all loads.

The same firm has recently introduced the air-blast controlling device shown in Fig. 5, the purpose of which is to control the pressure of the air blast to suit the varying loads in central-station work.

It has been recognized that the proper proportioning of the air to the load and hence to the amount of fuel used results in a smoother-running engine due to better combustion of the fuel owing to a reduction of the cooling effect of the incoming air.

In the device shown in Fig. 5 two pointers are fitted centrifugally on a dial calibrated in pounds per square inch of blast-air pressure ranging from the pressure suitable for no load up to that for full load, one pointer being operated by the blast-air pressure and the other by the main generator current passing through the solenoid *A*. The calibration of the gage is so adjusted that the latter finger points to the pressure which is suitable for the power being given by the engine instead of to the amperes being given by the generator, as would be the case if the gage were being used as an ammeter, which, in fact, it is. The two pointers are insulated from each other, but are provided with platinum contacts coupled to wires through which the circuit can be made through the relay *H*. Thus, if the generator pointer is separated from the

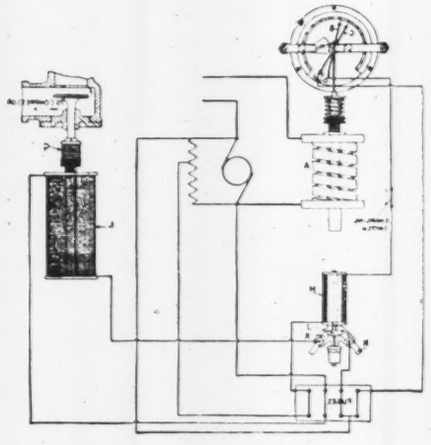


FIG. 5 MIRRLEES AIR-BLAST CONTROLLING DEVICE

air-pressure pointer no current passes through the relay *H* and the core *J* falls and closes the circuit through the carbons *K* and so through the solenoid *L*, which opens the throttle valve *F* to the air compressor and increases the supply of air till the two pointers coincide. In actual practice when on a steady load the apparatus is constantly working and it has been found that the improved combustion so procured actually increases the life of the exhaust valve.

Hick, Hargreaves & Co. state that their valve rockers are now made of cast iron, not the ordinary cast iron of commerce, but something more of a malleable nature, and they give no trouble.

The same firm evolved the cylinder cover shown in Fig 6. Their belief was that one could not expect to get a rigid casting of unequal thickness to withstand the unequal temperature stresses to which this part is subjected. The utmost possible flexibility has therefore been aimed at and only the inlet- and exhaust-valve pocket walls are carried right through. This leaves a large space between the two pockets for water circulation. This space is not completely filled in by the fuel-valve pocket as is usual, and instead of a thick cast-iron ring a light steel tube is used. This tube is screwed into the bottom and a watertight joint is secured at the bottom by a series of sharp concentric serrations on the face of the lower shoulder, the top being riveted over. The air-starting valve pocket is formed in the same way. Then in order to obtain the full benefit of the passages so formed, internal combustion pipes are fitted (shown dotted in the drawing) which direct the water round the exhaust and fuel valve and make for thorough cooling of those parts.

In the engines of Willans & Robinson, Ltd., the fuel-pump suction valve is used as the medium for stopping the engine in the event of the failure of the water circulation.

From the article it would appear that a good deal of attention is paid by British Diesel engine manufacturers to the neat design of their air compressors. *(The Engineer,* vol. 128, no. 3328, Oct. 10, 1919, pp. 349-351, 6 figs., *d)*

Practical Brake-Horsepower Formula for Internal-Combustion Engines

A PRACTICAL BRAKE-HORSEPOWER FORMULA FOR INTERNAL-COMBUSTION ENGINES, Herman Lemp. The author's formula has been derived from the old formula, $PLAN/33{,}000$, and is peculiarly convenient in that all its numerical coefficients have been combined into a single round number, 1,000,000. This formula is:

For a single-acting multi-cylinder engine of the four-stroke cycle type:

$$\frac{s \times d^2 \times n \times N \times MP}{1{,}000{,}000} = BHP \ldots\ldots [1]$$

To suit these conditions the special formula described above has been derived from the well-known horsepower formula: $PLan/33{,}000 = IHP$, which gives the indicated horsepower of a single-cylinder double-acting engine, in which P stands for the mean effective pressure in lb. per sq. in. of piston area (usually termed MEP), L for the length of piston stroke expressed in feet, a for the area of piston expressed in square inches, n for the number of strokes ($2 \times$ revolutions) per minute, and 33,000 for the ft-lb. per min. contained in one horsepower.

To adapt this formula to the brake horsepower of a multi-cylinder engine of the four-stroke cycle, single-acting type, the formula becomes:

$$\frac{PLan \times N \times M}{33{,}000 \times 2} = BHP$$

where M stands for mechanical efficiency, N stands for the number of pistons, and n for number of revolutions.

Since in a four-stroke cycle an active stroke occurs only every other revolution, the formula is divided by 2, or further expanded becomes:

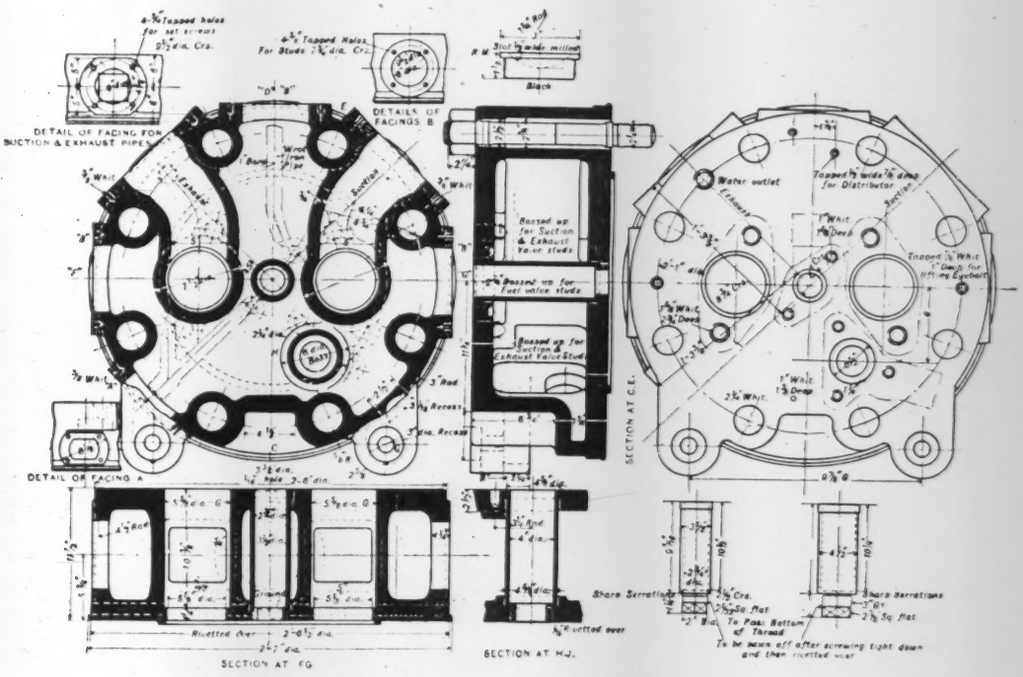


FIG. 6 HICK, HARGREAVES & CO. DIESEL-ENGINE CYLINDER COVER

For a single-acting multi-cylinder engine of the two-stroke cycle type:

$$\frac{s \times d^2 \times 2 \times n \times N \times MP}{1{,}000{,}000} = BHP \ldots\ldots [2]$$

in which s stands for stroke of piston in inches, d for diameter of piston in inches, n for number of revolutions per minute, N for number of pistons (not cylinders), MP for mean effective pressure (MEP) in lb. per sq. in. of piston area multiplied by mechanical efficiency.

For a double-acting engine [1] and [2] should be multiplied by 2.

The preponderant number of internal-combustion engines are single-acting, of multiple-cylinder type, and work on the four-stroke cycle. They are mostly used in automobiles, motor boats, airplanes, and stationary lighting sets, and are usually of a speed so high that the taking of indicator diagrams is not practical, while on the other hand the brake-horsepower outputs are easily ascertained by a cradle dynamometer, a Prony brake, or a plain electric generator whose efficiency curve is known. Furthermore, the stroke of such an engine is usually expressed in inches.

$$\frac{P \times \frac{s}{12} \times d^2 \frac{3.14}{4} \times n \times N \times M}{33{,}000 \times 2} = BHP$$

The formula may now be simplified by writing all constant factors together, followed by variables; thus we have:

$$\frac{3.14}{4 \times 12 \times 33{,}000 \times 2} \times s \times d^2 \times n \times N \times MP = BHP$$

The first part of the formula may now be solved and replaced by $\frac{1}{1{,}008{,}403}$, or for all practical purposes $\frac{1}{1{,}000{,}000}$, and we then have the final formula [1] shown at the head of this article, namely,

$$\frac{s \times d^2 \times n \times N \times MP}{1{,}000{,}000} = BHP \ldots\ldots [1]$$

The fact that the quotient of the constant factors $\frac{1}{1{,}008{,}403}$ when

replaced by $\frac{1}{1{,}000{,}000}$ produces an error of less than nine-tenths of one per cent had been discovered accidentally by the writer at the time this formula was developed, and it is this feature which renders the formula particularly useful.

We may now write the formula in the following form:

$$\frac{s \times d^2 \times n \times N}{1{,}000{,}000} = \frac{BHP}{MP}$$

showing that the relation between *BHP* and *MP* remains for any set of conditions.

The slide rule is extremely useful for solving either *BHP* or *MP*, by multiplying $s \times d^2 \times n \times N$ and setting 1 on scale *C* over the product, when by means of the rider either *MP* may be read off on scale *C* or *BHP* on scale *D*. This is best illustrated by a complete example:

A four-cylinder, four-stroke cycle engine of 5-in. bore, 6-in. stroke delivers at 600 r.p.m., 22.9 b.hp. What is its *MP*?

$$6 \times 5 \times 5 \times 600 \times 4 \times MP = 22.9\ BHP$$

Multiplying $6 \times 5 \times 5 \times 600 \times 4$ on the slide rule brings the rider to 36 on scale *D*, opposite which having placed 1 on scale *C*, one will find opposite 22.9 on scale *D* an *MP* of 63.6 on scale *C* (see Fig. 7).

This *MP* (accurately 64) is based on 80 *MEP*, with a mechanical efficiency of 80 per cent, which with a compression of 60 lb. is reasonable to expect in a normally designed engine.

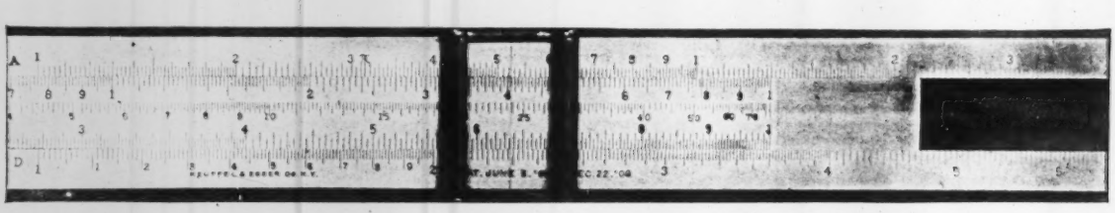


FIG. 7 ILLUSTRATING THE APPLICATION TO THE FORMULA OF A CONCRETE CASE BY USE OF THE SLIDE RULE

With slide rule set as above, the respective values of *MP* and *BHP* can be varied at will, since their relation remains constant.

The writer wishes to lay particular stress on the value of *MP* as a characteristic value whereby to compare engines. We find this value in recent works and technical papers expressed as *mean effective pressure per b.h.p.* or *brake mean effective pressure.*

The writer has already recommended that *mean pressure* or its symbol *MP* should be adopted for this value and this figure is being used more frequently. A high *MP* is an indication that both the indicated horsepower for a given displacement is high and the internal friction is low, hence a large b.hp. is developed.

To illustrate: Diesel engines have a very high mean effective pressure owing to a high thermal efficiency, but the mechanical efficiency is relatively low as compared with automobile engines of the constant-volume type. For this reason the *MP* is only slightly larger than that of an engine of the constant-volume type. An *MP* of from 70 to 84 is the average.

On the other hand, we have quite a number of aviation engines of the constant volume type which have an *MP* as high as 100 and 105. This is due to the high thermal efficiency with a high mechanical efficiency. *(General Electric Review,* vol. 22, no. 10, October 1919, pp. 808-809, *pA)*

CHANGES IN ENGINE DESIGN DUE TO POORER GRADES OF FUEL, P. J. Dasey. The author, who is research engineer for the Buda Company, claims that fuel changes are imposing serious handicaps on the production and use of the present types of combustion engines.

In one Detroit factory where records are kept of each carload of gasoline received, it was found that early in 1916 there was delivered in tank-car lots gasoline of which 92 per cent distilled over 300 deg. fahr. In 1917 one sample tested showed an end point of 327 deg. fahr., another 350 deg. fahr. and all the rest 400 deg. fahr. In 1918 the first sample tested showed an end point of 429 deg. fahr. In 1919 the end point gradually rose from 425 to 465 deg. fahr., and it seems to be understood that the present grade of fuel can last but a few months before it will have to stand another addition of kerosene in order that sufficient volume of fuel be produced to take care of the present automotive equipment.

It means that within a comparatively short time practically the only available fuel will be composed of what used to be gasoline and kerosene mixed. In other words, the distillation process will be carried on without a stop until all the light and heavy naphthas are wrought into one fuel and that fuel will have an end point of about 500 deg. fahr. or higher.

The use of the heavier fuel, however, is apt to cause crankcase dilution, a condition which is more serious in engines using lighter grades of lubricating oil (such as are commonly used in splash-feed engines) than in those of the pressure-feed types in which heavier oils can be used. *(Power Wagon,* no. 180, November 1919, p. 25, *p)*

MACHINE PARTS AND DESIGN

THE EQUATION OF THE INVOLUTE, N. Finkelstein. The mathematics of an involute curve are of interest because they apply to the design of the involute form of gear tooth. The writer evolves simplified formula for finding the thickness of the tooth at any point from the base circle to the point of the tooth. The article is of a mathematical character not suitable for abstracting, notwithstanding its interest. *(American Machinist,* vol. 51, no. 15, October 9, 1919, pp. 693-694, 2 figs., *m)*

THE MANUFACTURE AND DESIGN OF TOOTH GEARING. A general paper of which the most interesting part is that referring to tooth pressures for lubricated gearing.

The following method of determining tooth pressure for spur and double helical reduction gearing is used by an Italian firm, Luigi Pomini, Castellanza, Milan. It has been found to give good results with spur gearing, and is being applied tentatively to double helical gearing:

P = load in lb. per in. of width of tooth
p = circular pitch in inches
v = velocity of pitch line in ft. per sec.
R = factor depending on the number of teeth in the pinion and the reduction ratio

$$P = Rp \times \frac{1480}{v + 32.8}$$

For cast-iron spur gears the value of P is taken as above; for steel spur gears 3 P is taken as load; for cast-iron double helical, 1.5P is taken and for steel double helical, 4.5P. Values of R are given in the following table and apply to enclosed lubricated gearing.

No. of Teeth in Pinion	Reduction Ratio							
	1:1	1:2	1:3	1:4	1:5	1:6	1:8	1:10
12	2.8	3.4	3.8	4.2	4.36	4.54	4.8	5.0
14	3.2	3.8	4.2	4.6	4.88	5.08	5.4	5.6
16	3.5	4.2	4.64	5.06	5.36	5.58	5.84	6.1
18	3.8	4.4	5.0	5.4	5.76	5.96	6.24	6.44
20	4.2	4.9	5.4	5.9	6.2	6.4	6.88	6.9
24	5.0	5.76	6.3	6.8	7.04	7.3	7.6	7.8
28	5.7	6.4	7.04	7.6	7.88	8.14	8.5	8.64
32	6.4	7.28	7.92	8.4	8.8	9.04	9.4	
36	7.2	8.1	8.76	9.24	9.6	9.88		
40	7.9	8.84	9.56	10.28	10.44			

These factors have been deduced from observations on the wear of lubricated teeth with circular pitches varying from ½ in. to 2½ in. They are valuable in determining tooth pressures for high-speed gearing where wear of the teeth is the determining factor.

In the discussion which followed, Bernard H. Brown called attention to the alleged lack of uniformity in the proportions of stub teeth adopted by different makers. He found that teeth cut to the dimensions given in the following table (40 deg. included angle) gave satisfaction in every way.

Pitch, diametral	Cutter pitch	Thickness of tooth on pitch line in.	Dedendum in.	Addendum in.	Whole depth, in.	Amount added to pitch diam. to obtain outside diam., in.
2 to 2½	2	0.7854	0.463	0.400	0.863	0.8000
2½ to 3	2½	0.6283	0.3857	0.3333	0.719	0.6666
3 to 4	3	0.5236	0.289	0.2500	0.539	0.5000
3½ to 4½	3½	0.4488	0.257	0.2222	0.479	0.4444
4 to 5	4	0.3927	0.231	0.2000	0.431	0.4000
5 to 7	5	0.3142	0.165	0.1429	0.308	0.2858
6 to 8	6	0.2618	0.145	0.1250	0.270	0.2500
7 to 9	7	0.2244	0.129	0.1111	0.240	0.2222
8 to 10	8	0.1963	0.116	0.1000	0.216	0.2000
9 to 11	9	0.1745	0.103	0.0919	0.196	0.1818
10 to 12	10	0.1571	0.0935	0.0833	0.180	0.1666

(*Transactions of the North-East Coast Institution of Engineers and Shipbuilders*, vol. 35, pt. 3, May 1919, pp. 134 and 136, *gp*)

WEDGE BOLT. Description of a device intended to take the place of the standard bolt. As shown in Fig. 8, it consists, first, of

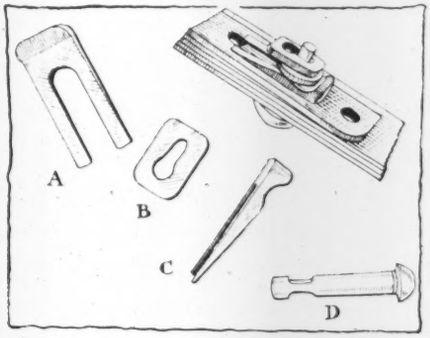


FIG. 8 WEDGE BOLT

a wedge slotted through its length to accommodate the thickness of the bolt; next, of a washer with a hole resembling an ordinary keyhole; and, third, of the bolt or pin which is a plain unthreaded bolt with two shoulders or rather slots punched on opposite sides near its point.

The procedure on the job is as follows. While one workman passes the pin or bolt through the hole, another slips the keyhole washer over the pin. It is engaged in the slot, bears on the shoulder and then the wedge is placed between the washer and the bolt; the workman gives it a few raps with his hand hammer and is ready for the next.

The plates are then reamed if necessary, and the riveter follows to perform his particular task. As each wedge bolt is passed the riveter taps the wedge with his hammer and as the contrivance is released the holder-on at the other side of the plate takes out the pin and sticks another (hot one) through in its place. It is stated that at a plant in Portland a hull is being constructed with these wedge bolts without the use of a single threaded nut. (*Pacific Marine Review*, vol. 16, no. 11, November 1919, pp. 118, 1 fig., *d*)

MACHINE SHOP (See Machine Parts and Design)

MARINE ENGINEERING

TURBINE-GEAR DRIVE FOR TORPEDO-BOAT DESTROYERS, W. B. Flanders. The design of propelling machinery for destroyers is an unusually difficult problem in view of the fact that a 1200-ton destroyer requires propelling machinery of a capacity equal to that put into a 30,000-ton battleship and that this machinery must be operated by a force of 30 to 40 men in the small boat as against 200 in the large boat.

The relatively greater power required by the destroyer is due to its higher speed. The power required increasing approximately as the fourth power of the speed and the two-thirds power of the displacement. As the propeller speed can be increased with the ship speed, the speed of the propelling machinery can also be

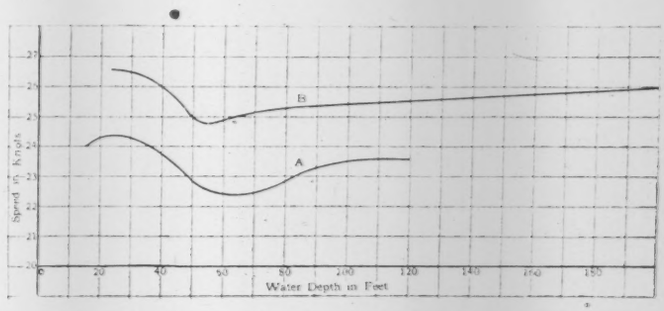


FIG. 9 SPEED CURVES OF DESTROYERS IN VARIOUS DEPTHS OF WATER AND WITH CONSTANT INDICATED HORSEPOWER

increased, in addition to which the type of machinery must be of the simplest form possible consistent with reliability and economy.

Increased rotative speed means decreased size and weight of driving machinery. The use of reduction gears allows the main turbines to have higher speeds, which, in its turn, leads to decreased steam consumption with the resultant decrease in weight of fuel necessary for a given cruising radius. Furthermore, with the high-speed geared turbines a relatively large number of rows of blades or stages can be used at slower speeds, at which the boat chiefly operates, which tends to give good efficiency at these speeds.

The article gives brief information on the fuel economy of boats of the *Clemson* type compared with similar data of the U. S. battleship *Tennessee*. It is of interest to note in this connection that in unofficial builders' trials on the *Clemson* at about 30 knots the machinery developed a shaft horsepower on slightly less than one pound of oil per hour, and that the boats reached a full speed ahead of 35 knots.

Interesting data are presented in reference to the influence of the depth of water in which a boat is moving on its speed. In general, the deeper the water up to at least one boat length, the faster the boat will go with the given propulsive power, but with long narrow boats of the torpedo or destroyer type there may be a shallow depth at which the boat speed will actually be higher than at any greater or lesser depth. This is shown in Fig. 9 made from trial data and has been confirmed in trials of the destroyers of the *Clemson* type. (*The Electric Journal*, vol. 16, no. 11, November 1919, pp. 474-476, 6 figs., *de*)

METALLURGY

Occlusion of Gases by Metals

THE OCCLUSION OF GASES BY METALS. At the meeting of the Faraday Society, London, November 12, 1918, a general discussion took place on the occlusion of gases by metals.

The president, Sir Robert Hadfield, gave a brief historical account of the development of our knowledge of this subject and then proceeded to discuss the nature of occlusion of gases.

As showing the remarkable influence of gas upon such a metal as nickel, the following experiments were carried out by the speaker. Nickel wire was obtained of very high purity and malleable, the latter quality being shown by the fact that it was drawn into excellent wire free from all defects. This wire was heated three times in an oxidizing Bunsen flame reaching a temperature of about 1000 to 1100 deg. cent.; another specimen was also heated, but in a reducing flame of about 900 to 1000 deg. cent. Both specimens remained unchanged, but on heating the third time in an oxidizing flame over a dish of burning sulphur the wire became quite brittle and similar results occurred when heating to about 1000 deg. cent. over an open coke fire, this showing the penetrability of gases into this metal.

It was only after difficulties due to the presence of occluded gases had been overcome that it became possible to produce intricate steel castings; for example, hydraulic cylinders for cotton baling presses, the design of which is discussed in some detail by the writer.

Sir Robert Hadfield also touched in some detail on the subject of slag inclusion and critical forging temperatures, and appended to his address a bibliography on occluded gases covering 73 items.

Prof. Alfred W. Porter of University College, London, opened his discussion with some general remarks on occlusion of gases in metals, discussing, among other things, the occlusion of hydrogen in palladium.

A paper by Cosmo Johns was devoted to the consideration of the physical properties of metals as affected by their occluded gases. In particular, he objects to the use of the term "occlusion" to cover all the complex changes that must occur when various gases are absorbed by or become constituents between gases that were originally absorbed as such, and those formed as reaction products during cooling. The first might be called primary and the last-mentioned secondary.

There is evidence that under certain conditions iron above the critical range can absorb nitrogen and that the properties of iron and steel are seriously affected when such absorption takes place.

On the whole, the writer believes that under the term "occlusion of gases in metals" there have been included such widely differing phenomena as solution, the formation of definite compounds which may dissociate when the conditions are changed, and gaseous products formed as the result of reactions between non-gaseous substances in solution in the liquid metal which had undergone changes in concentration, and thus were no longer in equilibrium, during the consolidation of the metallic mass.

The gaseous constituents of the metals used for constructional purposes affect their properties more profoundly than is generally admitted.

As all the metals used for industrial purposes contain gases as constituents, and as all the more complete physical investigations of the common metals have been made on specimens containing such gases, it follows that we have no knowledge of the properties which the pure metals or alloys would possess, if they could be produced, and such data as are available can only refer to metals or their alloys with an unknown quantity of gases as important constituents.

Capt. J. W. McBain discussed the theories of occlusion and the sorption of iodine by carbon. As regards the latter, in particular, it is claimed that adsorption may be accompanied by absorption, so that, in addition to rapid condensation on the surface, there may be a slow diffusion which goes on for long periods of time. This was shown in experiments on the sorption of iodine by carbon, extending over periods of many years. The writer gives the following summary of his views:

It is once more emphasized that sorption phenomena should not receive clear-cut designations as adsorption and absorption (solid solution), etc., until the experiments have adequately shown that the particular case is a pure type of only one of these factors, which are known in a number of cases to occur simultaneously.

Attention is drawn to Langmuir's hypothetical explanations of all these chemical phenomena, in which he has crystallized out views shared by a number of authors.

The long-continued diffusion following on rapid surface condensation involves in the case of animal carbon more than half of the total iodine sorbed.

Thomas Baker, in a paper on the gases occluded in steel, describes an investigation carried out with the view to determining the effect of occluded gases on the physical properties of steel and also to discovering the relation, if any exists, between the temperature of evolution of the gas and the critical points of the steel.

The results of all the experiments are collected in the following table.

Description	Weight of Steel in grms.	Volume of Gas per grm. of Steel in c. c.	Volume of Gas in c. c.	Average percentage composition				
				CO_2	H_2	CO	CH_4	N_2
Sound steel	69.3	1.32	91.86	1.68	52.00	45.53	0.72	0.07
Sound steel reheated	47.3	1.40	66.54	1.16	49.55	45.99	2.71	0.59
Steel with blowholes	63.2	0.66	42.10	0.88	54.56	42.36	1.73	0.47
Soft ingot	66.6	1.03	68.84	1.18	52.12	45.64	0.73	0.33
Bar from soft ingot	67.7	0.53	36.25	0.91	49.08	48.12	0.11	1.77

Thermal critical points of these steels occur at the following temperatures:

	A_{C1}	A_{C2}	A_{C3}	A_{r1}	A_{r2}	A_{r3}
Sound steel and steel with blowholes	746 deg.	746 deg.	746 deg.	693 deg.	693 deg.	693 deg.
Soft steel ingot and bar	722 deg.	758 deg.	867 deg.	682 deg.	760 deg.	846 deg.

(*Transactions of the Faraday Society*, vol. 14, pt. 3, July 1919, pp. 173-231, *etA*)

MOTOR-CAR ENGINEERING (See Internal-Combustion Engineering)

POWER PLANTS

Influence of Air Leakage on Design and Operation of Surface Condensers

CALCULATION OF DIMENSIONS AND CONDITIONS OF OPERATION OF SURFACE CONDENSERS WITH AIR LEAKAGE, K. Hoefer, Dr. of Engrg. An extensive, largely mathematical discussion of the influence of air leakage on the design and operation of surface condensers. An attempt is made to establish formulæ which will permit determining numerically the behavior of a condenser under various operative conditions, in particular the influence of air leakage on the available vacuum.

The presence of air in a condenser has as a consequence the fact that the temperature of steam is not all the time equal to the saturation temperature t_c of the steam corresponding to the condenser pressure p_c, but there occurs a fall of temperature with the fall of partial pressure due to falling off in the weight of steam through condensation.

The author states that there are ten factors affecting the degree of vacuum available, namely, (1) cooling air of the condenser, (2) amount of steam handled, (3) amount of cooling water, (4) temperature of cooling water, (5) weight of air leakage, (6) efficiency of air pump, (7) coefficient of heat transmission from steam to

cooling water, (8) coefficient of heat transmission from water of condensation to cooling water, (9) coefficient of heat transmission from air to cooling water and (10) design of condenser. The writer discusses all these points in succession, though not in the order given, and starts with point 10, which is "design of condenser."

In this connection he points out that while the construction of the condenser, the type employed, etc., materially affect the vacuum, these are factors which cannot be expressed numerically. Because of this, a certain amount of estimating based on the experience or judgment of the designer has to be used in applying the formulæ expressing the influence of the other factors to each individual condenser installation.

Coefficient of Heat Transmission from Steam to Cooling Water and from Water of Condensation to Cooling Water. He points out, in this connection, that these coefficients are materially affected by the velocity of flow of cooling water and, in addition to it, such other factors as diameter, length, material, wall thickness and character of surface of the condenser tubes; likewise, by the amount of turbulence in the flow of the water.

Of all these factors the author considers only the influence of the velocity of flow of cooling water when it is desirable to determine the amount of vacuum obtainable from a given condenser of given dimensions at different rates of flow of cooling water. In this case the velocity of flow of cooling water and hence the coefficient of heat transmission varies as the amount of cooling water flowing per unit of time, and the upper curve in Fig. 10 may be used as expressing average conditions. The lower curve on the same figure gives the coefficient of heat transmission from water of condensation to cooling water.

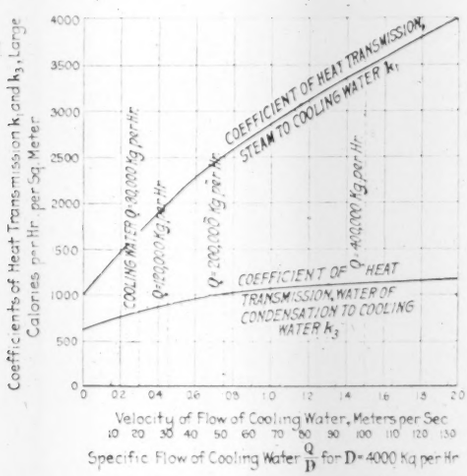


FIG. 10 COEFFICIENTS OF HEAT TRANSMISSION

It may be stated in this connection that the coefficient of heat transmission from steam to cooling water depends also on the steam pressure, as has been shown in a previous investigation of the author. The influence of steam pressure is however only slight and the coefficient of heat transmission has been shown in the tests carried out by the writer to rise only about 5 per cent when the steam pressure in the condenser increases from 0.1 to 0.2 atmos. abs.

Coefficient of Heat Transmission from Air to Cooling Water. In this connection, the writer uses an equation previously derived by Nusselt.

Further, the writer states that of the factors affecting the vacuum obtainable in a condenser, particular attention must be paid to air leakage. Since it is believed to be impossible to derive general formulæ which would cover this case, a numerical example is taken as the basis of consideration. It is assumed that we have a surface condenser 100 sq.m. (1076.4 sq. ft.) cooling area operating with cooling water having an inlet temperature of 15 deg. cent. (59 deg. fahr.) The condenser works in connection with the steam turbine operating on steam of 12 atmos. abs. pressure and 300 deg. cent. (572 deg. fahr.) superheat, or a heat content of 728.3 large calories per kg. (2882.9 B.t.u. per lb.) At full load of 800 hp. the turbine consumes 4000 kg. of steam (8818 lb.) per hour, if the consumption of the cooling water is 200,000 kg. (440,924 lb.) per hour or 50 times that of the steam and if there is no air leakage in the condenser. As will be shown later, to do this the condenser pressure must be 0.046 atmos. abs., which, together with the amount of steam used, the initial state of the steam and output, gives the effective efficiency of the turbine as 58 per cent. It is further assumed that the output of the turbine does not vary with varying vacuum in the condenser, but if, under these conditions, the condenser pressure rises above 0.046 atmos. abs. the steam consumption becomes greater than 4000 kg. per hour or vice versa. This assumption is more in correspondence with actual conditions than that of constant steam consumption. For the purpose of computing the steam consumption it is further assumed that the efficiency of the turbine does not vary, which is not exactly a fact, however. Fig. 11 gives the theoretical (adiabatic) heat difference, the usefully employed heat, and the steam con-

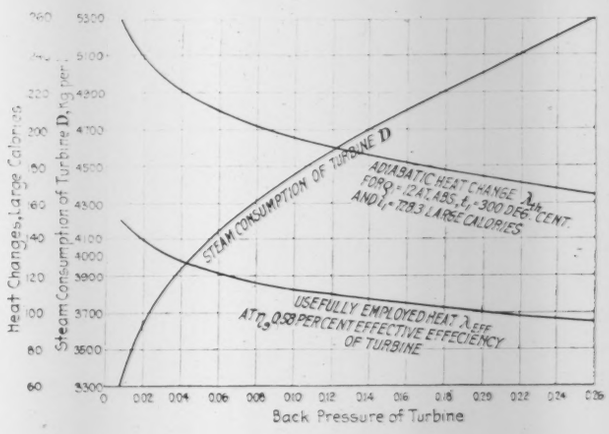


FIG. 11 FALL OF HEAT AND STEAM CONSUMPTION IN A 800-HP. STEAM TURBINE WITH VARIABLE CONDENSER PRESSURE

sumption D of the turbine for various condenser pressures, the fall of pressure between the turbine and condenser being neglected.

Next are discussed the influence of dimensions and kind of air pumps used, influence of the cooling water and of the cooling area available, all of these being illustrated by curves. (Berechnung und Betriebsverhältnisse der Oberflächen-Kondensatoren unter Berücksichtigung der in den Kondensator eindringenden Luft, K. Hoefer. *Zeitschrift des Vereines deutscher Ingenieure*, vol. 63, nos. 27-28, July 5-12, 1919, pp. 629-635 and 650-653, 14 figs., *t*)

RAILROAD ENGINEERING

Gasoline Engines for Street-Railway Cars

GASOLINE VS. ELECTRIC MOTORS, N. W. Storer, Mem.Am.Soc. M.E. Discussion of the respective merits of the two types of propulsion for street-railway service. The writer claims that while the gasoline motor is excellent for certain classes of service such as automobile and truck work, it is not suitable for street-railway cars.

The electric motor is almost ideally suited for street-railway service. Its speed-torque characteristics meet the requirements as the electric motor has the enormous starting torque of the overload capacity and flexible speed characteristics necessary to give the rapid acceleration and different speeds for street-railway service. In point of reliability it also stands very high and its cost of maintenance, depreciation and power are all relatively low.

The gasoline motor can make street cars run but its speed-torque characteristics are not well adapted for the work. Thus, it absorbs from 25 to 30 per cent of its normal amount of power when running idle. It has no starting torque and very little torque at low

speeds. Gear ratios help to balance this weakness, but at best the gasoline motor would give a very poor acceleration for a street car unless it were very much overmotored.

The reliability of the gasoline motor is also claimed to be less than that of the electric motor.

As regards costs, it is claimed that they would be higher for gasoline cars because the cost of maintaining the transmission on motor trucks and motor buses is very high. It is also claimed that the life of a gasoline motor is shorter than that of an electric motor.

It may be well to call attention, in this connection, to the fact that whenever the author speaks of motors for street-railway service he compares the electric motor with the aeroplane-type gasoline motor, which is, of course, the very last thing that could be thought of for applying in street-railway service. *(Aera,* vol. 8, no. 3, October 1919, pp. 375-378, *g)*

STEAM ENGINEERING (See also Power Plants)

TIN FUSIBLE BOILER PLUGS: MANUFACTURE AND TESTING, L. J. Gurevich and J. S. Hromatko. Data of an examination, at the Bureau of Standards, of tin fusible boiler plugs for the Steamboat Inspection Service and of the tests made subsequently.

The experimental results show that there are six primary causes for the rejection of fusible plugs which may be roughly divided into two classes. Under the first class, rejections are included due to mechanical defects of casing material. The second class includes rejections due to lack of purity of the tin filling. The impurities in the latter case may be those either present in the original tin or those introduced during the manufacture of the plug.

The following conclusions have been reached as to the precautions to be taken in the manufacture of fusible plugs:

1 The pig tin should be at least 99.7 per cent pure, containing not more than 0.1 per cent lead, or 0.1 per cent zinc, which are the requirements of the Steamboat Inspection Service.

2 The casing should be of bronze, an alloy the major constituents of which are copper and tin. Small amounts of zinc and lead increase the ease of casting and machining and are not objectionable if not present in greater amounts than in the following compositions:

	I	II
Copper	88	87
Tin	10	7
Zinc	2	5
Lead	..	1

3 The pot or crucible for melting the tin should not be used for melting other metals, thus doing away with the liability of contaminating the good tin when these are not thoroughly cleansed.

4 Casings should be tinned on the inside with the same grade of tin used for filling, but the tin left over from this process should not be added to the filling to be used. Zinc-chloride flux may be used although hydrochloric acid is preferred, though no flux need be used during the filling process.

5 The casing should be preheated to not above 250 to 275 deg. cent. (482 to 527 deg. fahr.) and tin should be poured at a temperature not above 275 to 300 deg. cent. (527 to 572 deg. fahr.). *(Bulletin of the American Institute of Mining and Metallurgical Engineers,* no. 152, August 1919, pp. 1351-1360, *epA)*

FLOW OF STEAM THROUGH PIPES, Bassett Jones. Formulæ for the flow of steam through pipes simplified in such a manner as to lend themselves to accurate computation.

The ultimate formula given is

$$W = 60\ Ac\ \sqrt{(pD/L)} = m\ \sqrt{(pD/L)}$$

where A is the area of the pipe in square feet, c a constant, p pressure drop in pounds per square inch, D mean density of steam in pounds per cubic foot, L equivalent length of straight pipe. The value of $m = 60\ Ac$ may be computed once for all for each pipe size.

Values of $\sqrt{(pD)}$ for various values of pD can be computed for various initial pressures and in the original article a table is given for same, so that the only computation not of plain first order multiplication necessary in any application of the above formula is the finding of the value of $\sqrt{L}$. In computing L the usual allowances must be made for fittings, valves, openings, etc.

The author gives several examples of the application of this formula. *(General Electric Review,* vol. 22, no. 10, October 1919, pp. 805-807, 1 fig., *p)*

STANDARDIZATION

STANDARDIZATION OF SPINDLE NOSES FOR MILLING MACHINES IN GREAT BRITAIN. Because of the large number of American milling machines in Great Britain the proposed standard noses are designed to apply for the time being, only to machines of British manufacture, although the adoption of a common standard for British and American manufactures is recognized as being highly desirable.

The design of spindle noses has changed considerably in recent years as a result of the heavier duty which has been performed by milling machines. Screwed spindle noses have been found to be faulty for heavy work and the tendency has been to adopt on new designs either parallel or taper fits, holding the cutter back by a draw bolt through the spindle, the torsion being taken by the clutch drive.

It is generally agreed that some form of clutch drive is necessary on a spindle nose for heavy milling and it has also been found necessary to harden the clutch to prevent distortion.

The illustration in Fig. 12 shows four suggested standard noses.

The article does not state to what extent standardization of spindle noses has proceeded in Great Britain. *(The Engineer,* vol. 128, no. 3328, Oct. 10, 1919, p. 358, 1 fig., *dg)*

THERMODYNAMICS

THEORY OF EQUILIBRIUM CONDITIONS IN SATURATED STEAM: UNDERCOOLED STEAM. In a series of articles by H. M. Martin (see MECHANICAL ENGINEERING, February 1919, p. 150) it was claimed that when wet steam is expanded through a turbine it never attains a condition of thermal equilibrium until the condenser is reached.

In the criticisms to which the above hypothesis has so far been subjected there appears to be a disposition to accept the view that supersaturation does persist down to the Wilson line, but there has seemed to be more hesitation in admitting that thermal equilibrium is not reëstablished at the Wilson line and maintained throughout the remainder of the expansion. There is, however, some direct evidence in favor of the view that the condition of supersaturation persists.

In the first place, Wilson found that when the expansion was prolonged beyond the Wilson line the number of droplets formed was enormously increased, showing that those already in existence ceased to act as effective centers for condensation once they had attained a certain size, and any further condensation had to take place on other nuclei, which is possibly only when the steam is undercooled by some tens of degrees.

Again, the exhaust temperature of a turbine as measured by a thermometer appears in normal working conditions to be invariably a little below that corresponding to the pressure. In this connection Allen's condenser experiments are mentioned to show that the discrepancy is due not to erroneous readings from the thermometer, but conditions surrounding the operation of the thermometer prevented from giving reliable indications.

Coming back to the question of droplet formation, it is stated that any change of state involves either an increase of pressure or the performance of external work that change takes place with difficulty. A "catalyst" is commonly necessary to make the change possible. In the case of supersaturated steam not merely has work to be done in forming the surface films of the droplets, but the ultimate effect of the change from the undercooled condition is an increase in the volume occupied. The presence of a "catalyst" is

thus doubly necessary, and this is for the most part provided by the Wilson nuclei which are molecules having a constitution H_4O_2, or perhaps H_6O_3, or even possibly H_8O_4. The existence of these combined molecules in steam is proved by a comparison of the theoretical and actual volumes occupied by unit weight of the steam.

From this it appears that there are a certain number of aggregated molecules in steam, the number of which depends on the temperature and pressure of the steam and is quite unaffected by turbulence. It is on these aggregated molecules that condensation occurs when the expansion is carried far enough.

As has been stated above, the presence of a catalyzer of some kind is necessary for condensation to occur. The condensation of thermal equilibrium is more stable than that of supersaturation, but to pass from the one state to the other involves the performance of work. The energy liberated on condensation is not instantaneously available to this end, as time is necessary for its conversion into the form of heat. The presence of a catalyzer makes it possible for the transformation to take place in two stages. In the first stage condensation occurs without development of heat and with the consequent contraction in volume. In the second stage the energy liberated on condensation is converted into heat and absorbed by the vapor which, therefore, increases in volume of pressure. It is probable that the transformation is, for the most part, completed within a very small fraction of a second.

From this point of view it would appear that when condensation occurs at the Wilson line there must be at least a temporary diminution of volume and this decrease of volume is considerably greater than it would be if the weight of steam at first condensed were only that requisite to the ultimate attainment of thermal equilibrium. The condensation comes down in the first instance as droplets which are smaller than those known to show the Brownian movements. They may thus be considered as equivalent to molecules of a very dense gas and will not therefore add to the frictional resistance experienced by the steam as it passes through the turbine. When, however, such droplets coalesce to form large droplets, the conditions are changed, and it appears quite conceivable that such large droplets may give rise to increased losses in nozzle and blading.

It would appear also that condensation of steam at the Wilson line is likely to be excessive and expansion beyond the Wilson line will begin accordingly with the volume not intermediate between the equilibrium volume and the volume corresponding to no condensation, but may actually be considerably smaller than the latter. How long such an excessive condensation persists is not known, but if it may be untrue for any appreciable time, as is possible, expansion beyond the Wilson line will proceed with an unusual volume smaller and final volume greater than was provisionally presumed in the theory as was exposed by H. M. Martin. (Editorial article in *Engineering*, vol. 108, no. 2806, Oct. 10, 1919, pp. 483-484, *tA*)

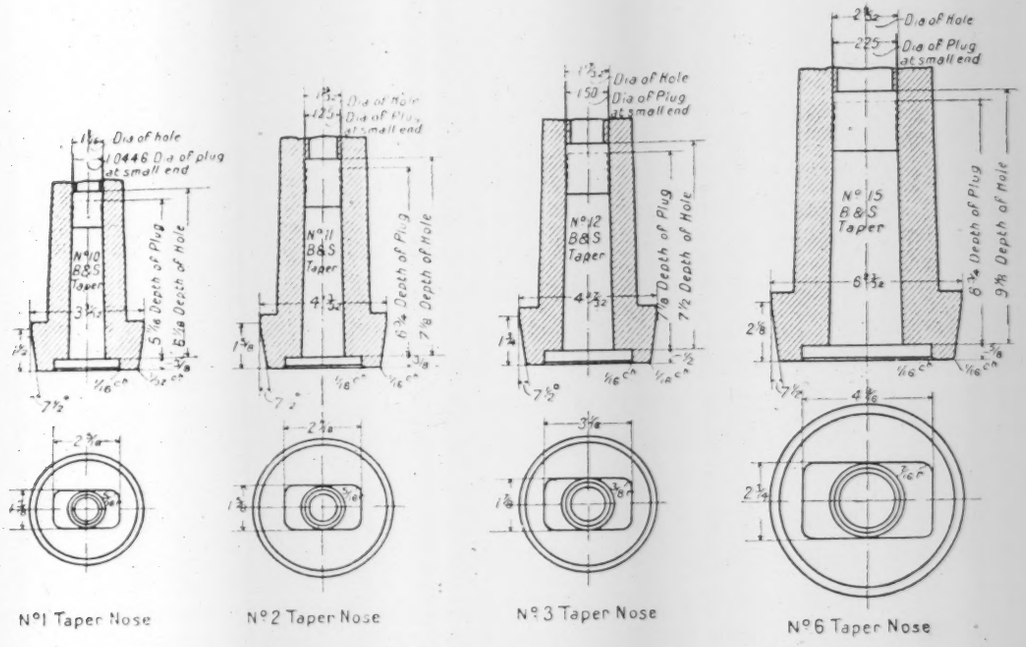


FIG. 12 SUGGESTED STANDARD NOSES FOR MILLING-MACHINE SPINDLES

VARIA

SOCIETIES, ASSOCIATIONS AND COMMISSIONS PROMULGATING SPECIFICATIONS FOR ENGINEERING MATERIALS, K. D. Williams. Brief data as to the activities, organizations and publications are given in reference to the following:

(*a*) Steamboat-Inspection Service, Department of Commerce, Washington, D. C.

(*b*) Bureau of Standards, Washington, D. C.

(*c*) American Bureau of Shipping, 66 Beaver Street, New York, John W. Coutillion, Secretary and Treasurer.

(*d*) American Society for Testing Materials, C. L. Warwick, Assistant Secretary, University of Pennsylvania, Philadelphia, Pa.

(*e*) American Society of Mechanical Engineers, Calvin W. Rice, Secretary, 29 West 39th Street, New York, N. Y.

(*f*) Bureau of Explosives, Underwood Building, 30 Vesey Street, New York, N. Y., J. E. Fairbanks, Secretary and Treasurer.

(*g*) American Institute of Electrical Engineers, 33 West 39th Street, New York, N. Y., F. L. Hutchinson, Secretary.

(*h*) Master Car Builders' Association, 746 Transportation Building, Chicago, Ill., V. R. Hawthorne, Acting Secretary.

(*i*) American Railway Engineering Association, Room 1011, 910 Michigan Avenue, Chicago, Ill., E. H. Fritch, Secretary.

(*j*) American Institute of Weights and Measures, 20 Vesey Street, New York, N. Y., F. A. Halsey, Commr. and Secy.

CLASSIFICATION OF ARTICLES

Articles appearing in the Survey are classified as *c* comparative; *d* descriptive; *e* experimental; *g* general; *h* historical; *m* mathematical; *p* practical; *s* statistical; *t* theoretical. Articles of especial merit are rated *A* by the reviewer. Opinions expressed are those of the reviewer, not of the Society.

MECHANICAL ENGINEERING

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Contributions of interest to the profession are solicited. Communications should be addressed to the Editor.

New York Printers' Strike Ended

Continuing in our efforts to publish as regularly as possible the successive numbers of MECHANICAL ENGINEERING regardless of the printing strike in New York, which completely tied up the printing plants of that city for a period of more than six weeks, this Journal is again issued from a plant outside of the city under difficulties which inevitably attend such an undertaking. It is expected that copies will reach the membership during the latter part of December.

In all probability the January number will again be published in New York City by our regular printers, who have the facilities for rapid production and will thus be able to gain time, which we hope will permit the distribution of the January number at a relatively earlier date. The striking printers have, for the most part, returned to their old positions, and it is believed that the stability of the industry is now assured, although still subject to conferences which are to be held for adjustments with regard to wages and other matters.

A Successful Annual Meeting

The fortieth Annual Meeting of The American Society of Mechanical Engineers, held in New York, December 2 to 5, was the largest meeting in the history of the Society, having a registration of upwards of 2100. In its professional sessions, its social features and in the many committee meetings was evidence of a fine spirit and enthusiasm, a close bond between members of this great organization and a loyalty to the high principles and ideals of the engineering profession.

Although the meeting nominally opened on Tuesday, December 2, there were various committee meetings on Monday. On Tuesday evening, the night of the presidential address, Honorary Membership was conferred upon Charles de Freminville, consulting engineer, Creusot Works, France, and announcement was made of Honorary Membership to be conferred upon Auguste C. E. Rateau, of the Rateau, Battu and Smoot Company, France. At the Business Meeting interest centered in the reports of the Aims and Organization Committee and of the Joint Conference Committee of the Founder Societies, discussion of which was continued in the afternoon of that day. No less than ten professional sessions were held, one of which, the keynote session, comprised a series of strikingly important addresses on Industrial Unrest, before an audience which filled the auditorium of the Engineering Societies Building.

On Thursday evening was the annual lecture and reunion, with two addresses, one by Col. E. A. Deeds, of Dayton, Ohio, on The Future of Aviation, and one by Col. Thurman H. Bane, on the Present Development of the Military Airplane. After the lectures the audience assembled upon the fifth floor of the Engineering Societies Building and on the first floor where there were reunions for a social time.

Although this number of MECHANICAL ENGINEERING will not reach its readers until well past the date of the meeting, it will be impossible to incorporate a further account of the meeting in this number, owing to the publication difficulties involved as a result of the printers' strike which has already been alluded to. It is expected that this report will appear in the January number.

Salaries of Engineers in Canada

A report dealing with the classification of engineering organizations and proposed qualifications and remuneration for engineering services, prepared by the Toronto Branch of the Engineering Institute of Canada, is published in the November issue of the journal of that society. *The salary schedule proposed by the committee is based on the pre-war cost of living and does not take into account the very great increase which has occurred during recent years.* Classifications are made for engineers employed in railway work, municipal work, industrial work, large public utilities, and public works.

Of greatest interest to mechanical engineers are the recommendations of the committee for engineers employed in industrial work, a summary of which follows:

Chief Engineer. A chief engineer in charge of research, mechanical, electrical, chemical or metallurgical work, should be a graduate from an engineering school recognized by the Institute, with from 10 to 15 years' experience in his special line, and should receive a salary from $3600 to $10,000, according to the size of the industrial works where he is employed, and the extent of his responsibility.

Assistant Chief Engineer. An assistant chief engineer in a large industry should preferably be a technical graduate with from 5 to 10 years' experience. His salary should be 75 per cent of the salary of the chief engineer, with a minimum of $3000. This recommendation applies also to the engineer in general charge of all outside construction.

Designing Engineer. The designing engineer having responsible charge of all design in any one of the branches of mechanical, electrical, structural, or heating and ventilating engineering, should preferably be a technical graduate with 5 years' practical experience in his special line, or, should be a high school graduate with 10 years' practical experience, and should have a good general knowledge of mathematics and the fundamental physical laws used in engineering. His salary should be 50 per cent of the salary of the chief engineer, with a minimum of $2700.

Estimating Engineer. The engineer in charge of estimating, figuring costs, etc., should preferably be a technical graduate with 3 years' practical experience in his special line, or, should be a high school graduate with 8 years' practical experience, and should have a good general knowledge of mathematics and the fundamental physical laws used in engineering. His salary should be 35 per cent of the salary of the chief engineer, with a minimum of $2400.

Testing Engineer. Same qualification and salary as for estimating engineer.

Resident Engineer on Construction. Same qualification and salary as for estimating engineer.

Designer, Assistant to Designing Engineer. The assistant designer to a designing engineer should preferably be a technical graduate with 2 years' practical experience, or should be a high

school graduate with 4 years' practical experience, and should have a good general knowledge of mathematics and the fundamental physical laws used in engineering. His salary should be $2400.

Chief Draftsman, responsible for all working drawings. To be qualified by training and experience for the special work required of him. (Salary not stated.)

Assistant Estimator. The assistant estimator to an estimating engineer should preferably be a technical graduate with 2 years' practical experience, or should be a high school graduate with 3 years' practical experience and should have a good general knowledge of mathematics and the fundamental physical laws used in engineering. His salary should be $2400.

Squad Boss. The squad boss, in charge of small squad of draftsmen, should be a high school graduate with 3 years' practical experience, including 1 year's experience as checker, and should have a good general knowledge of mathematics and the fundamental physical laws used in engineering. His salary should be $2100.

Chief Shop Inspector. The chief shop inspector, in charge of shop inspection, should preferably be a technical graduate with 1 year's experience, or should be a high school graduate with 3 years' experience as inspector, and should have a good general knowledge of mathematics and the fundamental physical laws used in engineering. His salary should be $2100.

Draftsman. A draftsman, making detailed working drawings, should preferably be a technical graduate or have 3 years' experience in drawing, tracing, etc. His salary should be $1800.

Engineers Honor Eugene Schneider of France

ON Monday evening, November 24, the Four Founder Societies, upon the invitation of the Mining and Metallurgical Society of America, joined with that organization in a testimonial dinner at the Hotel Biltmore, held in honor of Charles Eugene Schneider, head of the famous Schneider-Creusot Steel Works of France. The dinner was the occasion for the presentation to Dr. Schneider of the gold medal of the Mining and Metallurgical Society of America, which is annually awarded for research work in metallurgy. Dr. Schneider is the first other than an American to be so honored.

H. H. Knox, the president of the Mining and Metallurgical Society of America, was toastmaster, and the speakers were Bradley Stoughton, secretary of the American Institute of Mining and Metallurgical Engineers; Dr. Henry M. Howe, professor emeritus of metallurgy at Columbia University; Charles M. Schwab; and Brigadier-General Manus McCloskey, U. S. A.

A closer understanding between this country and France was urged by Dr. Howe, as he declared that future conflict with Germany was "inevitable." "German treachery persists," he said, "and will persist to plague our descendants. German vices spring from the nature of the people and not from their form of government. The Germans are avowedly criminal. They avow criminal intent."

Dr. Howe also called attention to the magnitude of the Creusot works, where 250,000 men are employed, and he pointed out that this works had supplied three-fourths of the French artillery used in the war, and also had furnished Belgium and Serbia with guns. Engineers from Creusot, he said, had been sent to the United States when this nation declared war to help in organizing the American steel industry for war.

Mr. Schwab also paid high tribute to the French ironmaster, whom he has known for thirty years. Mr. Schwab declared that there is a greater problem ahead of the Allies than forging guns of war, and that is the forging of the guns of public opinion, and no man, he said, was better qualified to do this than Charles Eugene Schneider.

General McCloskey told of the use to which the guns manufactured by Mr. Schneider were put by the American troops at the front.

Earlier in the day Stevens Institute of Technology, at Hoboken, N. J., conferred the degree of Doctor of Engineering upon Mr. Schneider. Dr. Alexander Humphreys, president of Stevens, conferred the degree and Mr. Schneider responded by a brief address, in which he praised the work of American engineers in France and suggested that French and American universities exchange students as well as professors.

Pan-American Financial Congress

An indication that engineers are no longer confining themselves to their profession but are playing a larger part in public affairs is found in the confirmation of the appointments of C. B. Lord, Mem.Am.Soc.M.E., of the St. Louis Section of the Society, and Calvin W. Rice, Secretary of the A.S.M.E., to the Permanent Group Committee of the Pan-American Financial Congress. The Permanent Group Committees were established at the time of the first Pan-American Financial Conferenee, May 25-29, 1915, by Secretary McAdoo, with a view to assembling and studying material concerning the financial and commercial relations between the United States and the countries for which they were respectively appointed.

The second Pan-American Financial Conferenee will take place in Washington, January 12-17, 1920. Mr. Lord, serving on the committee of the Dominican Republic, and Mr. Rice, on that for Bolivia, will join with other appointees in conferring with the official delegations from the other American republics. The Committee will enter into executive session to study the problems submitted by the official delegations from the different countries and will submit for the consideration of the entire conference conclusions which will be based upon its examination of those problems.

American manufacturers of machinery and engineering and structural materials will be interested to learn of the Andhra Engineering Company of Cocanada, India, who are endeavoring to introduce American machinery and engineering materials into the Indian market and desire to get into communication with American machinery firms. The information came through a letter forwarded by Clinton H. Scovell, Mem. Am. Soc. M. E., of Scovell, Wellington and Company, of Boston.

International Electrotechnical Commission

The International Electrotechnical Commission which suspended its meetings during the war, recently held a conference in London, at which 18 countries were represented by 52 delegates. A Special Committee on the Rating of Electrical Machinery was appointed in order to push forward this work, which was regarded as of the highest importance to the electrical industry, more particularly to its export trade. Increasing attention is being given to the work of the International Electrotechnical Commission by the manufacturers of the world who are prepared to coöperate in the formulation of standards for the simplification of international commerce.

The Librarian of the Public Library of Sydney in New South Wales has written the Society of their desire to obtain regularly any trade catalogs published by members of the Society. The "Condensed Catalogs" and other trade catalogs already received from the United States have been very freely used and it is felt that other catalogs would also be of valuable aid in fostering trade relations between Australia and the United States.

The headquarters for Rhodes scholarships in the United States from now on will be at the Massachusetts Institute of Technology. Professor Frank Aydelotte of the Institute staff has been appointed Secretary to the Rhodes scholars throughout the United States. He will have leave of absence from the Institute for this academic year and will devote all his efforts toward the selection of men from American universities who are to be sent to Oxford College.

Herbert Hoover to Head Mining and Metallurgical Engineers

HERBERT HOOVER, the engineer who so ably typifies the modern definition of engineering as written on the wall of the Engineers' Library in New York, "Engineering, the art of organizing and directing men, and controlling forces and materials of nature for the benefit of the human race," is to be the next president of the American Institute of Mining and Metallurgical Engineers.

Mr. Hoover received his early training as a mining engineer at Stanford University, Cal. He first served with the United States Geological Survey, then went to West Australia and China, in mining activities. He took part in the defense of Tientsin during the Boxer disturbance in 1900. He was also engaged as consulting and managing engineer in metallurgical, mining and railway operations in Mexico, Russia, Africa and India. His work in London up to the beginning of the world war was notable in that he departed from the usual share-promotion schemes of the mining market, developing the properties in which he was interested purely on technical lines.

HERBERT HOOVER

When the war broke out in 1914, he gave up his management and directorships and began his service on various committees and commissions. The first of these was as chairman of the American Committee in London. He began his work the morning after England declared war on Germany, taking charge of the relief of American refugees.

In October 1914 he organized the Commission for the Relief of Belgium. Under his supervision millions of people were continually supplied with food, many of whom were entirely dependent upon this relief. Shortly after America entered the war, Mr. Hoover was summoned to Washington to take charge of the food situation here. The problem was a large one, as food demands from Europe were centered upon the United States. His organization of volunteer workers all over the country did much in making this work successful.

Mr. Hoover served as member of the War Trade Council since 1917, as director general of Allied Relief, director general of the American Relief Administration, chairman of American Economic Delegation at Paris, chairman of Food Section of Supreme Economic Council of Peace Conference, including supervision of transportation and communications of Eastern Europe, and later, as chairman of the Supreme Economic Council.

The work that Mr. Hoover has done in relief of the civilian population of Europe since the signing of the armistice has proved again his right to the title of "engineering economist." In this great task which he has performed so successfully, those characteristics coloring all his achievements have again been emphasized. His ability to get men to do things, to organize them and direct them in action, his knowledge of the right methods to follow and the psychological moment to act in order to secure the full measure of support and the greatest degree of success, may be largely attributed to his training as an engineer and make him worthy of the many honors accorded him and especially of this one, the presidency of the American Institute of Mining and Metallurgical Engineers.

SLOW-SPEED TESTS OF KINGSBURY THRUST BEARINGS

(*Continued from page 917*)

On Friday, October 31, the machine was run at 0.5 r.p.m. for 4½ hours. The load was carried by the heavy spring throughout the run, but its compression gradually decreased. The machine was then run at various speeds, beginning with 3 r.p.m., to see if the bearing had been improved by its long run at 0.5 r.p.m. The bearing was to be maintained at each speed for 15 min. The friction force at low speeds was less than it had been in previous tests, but it remained constant from 2.85 to 2 r.p.m. It then slightly increased as the speed was further lowered, and remained constant from 1.87 to 1.66 r.p.m. From here on it gradually increased, but remained very low until the speed had been reduced to 1.01 r.p.m. At this low speed the friction coefficient was about one-third as great as the minimum value that had been obtained when the bearing had been run steadily for a whole day at 1 r.p.m.

On Saturday the test was begun at 1.5 r.p.m. and continued for 30 min. The coefficient was less than at same speed the previous day. This is explained by the assumption that the surfaces improved during the lower speed runs following that at 1.5 r.p.m. on Friday. At 1.25 r.p.m. the friction was still considerably less than the previous day. At 1.05 r.p.m. it was nearly as great as on Friday. At 0.88 r.p.m. it was increased about 75 per cent and continued to increase rapidly as the speed was lowered until 0.38 r.p.m. was reached. The motor was not belted to run slower than this, so that the run at this speed was continued. The friction coefficient at 0.38 r.p.m. gradually decreased as it had done at other speeds, indicating continued improvement in the bearing surfaces. The runs for Thursday, Friday and Saturday are plotted in Figs. 15, 16 and 17 of the complete paper.

No serious attempt has thus far been made to measure the starting friction. Some preliminary tests, however, have shown that it will vary with the length of time the bearing has been at rest.

The results of the tests already carried out indicate that the lower the speed at which the bearing is run continuously, the better the condition of the bearing surfaces. Speeds as low as 0.38 r.p.m. have thus far been employed and further tests will be made with yet lower speeds. Reference to the shoe areas mentioned in an earlier paragraph will show the range of pressures it is intended to employ. They will extend from the initial test of 132 lb. per sq. in. and a light oil to as high as 2000 lb. per sq. in. with a light and a heavy oil. The tests with the light oil will be continued as far as they lead to valuable results, then the tests will be run on heavy oil. When the tests are completed on the light oil, it will be easier to estimate how heavy an oil will be needed for continuing the tests. The author is gratified with the excellent showing made with a light oil, and is glad that he did not begin the tests with a heavy oil.

NEWS OF THE ENGINEERING SOCIETIES

Reports of Meetings of American Welding Society, American Paper and Pulp Association, Iron and Steel Institute, Illuminating Engineering Society, etc.

National Machine Tool Builders' Association

That business throughout the machine-tool industry has shown a steady gain since the beginning of the year, was the general consensus of opinion at the eighteenth annual convention of the National Machine Tool Builders' Association, held in New York on October 15 and 16. It was also brought out that, contrary to what was expected at the outset, the surplus equipment in the possession of the Government at the close of the war has not worked a material hardship upon the machine-tool industry, and that the remainder of this equipment yet to be disposed of ranges in value from $25,000,000 to $50,000,000. Of special interest was the report on the conditions of the machine-tool industry in Europe, presented by Alexander Luchars, president of The Industrial Press, who had returned recently from an extended trip of investigation overseas.

Association of Railway Electrical Engineers

The eleventh annual convention of the Association of Railway Electrical Engineers was held in Chicago on October 28 to 31. Among the committee reports presented there were three covering the various phases of electric-headlight operation and one on the subject of railroad electrification. The question of electric-headlight operation was of particular interest this year as the time is rapidly approaching when all locomotives must be equipped with high-power headlights to conform with the ruling of the Interstate Commerce Commission. The standards recommended by the Committee on Electric Headlights included those for generator baseplates, steam-pressure ranges, ball bearings, brush sizes and steam-pipe openings. The report of the Committee on Railroad Electrification contained a typical skeleton form for an electrification report, which was intended to serve as guide in procuring all data necessary to an intelligent and comprehensive conclusion and recommendation, together with a bibliography of articles and papers referring to steam-railroad electrification which have appeared in the American and foreign technical press during the years from 1908 to 1919.

American Welding Society

A meeting of the American Welding Society was held on October 24, at the Engineering Societies Building, New York, N. Y. The program comprised various addresses on the progress and development of the welding industry, and an account by Prof. Ralph G. Hudson of a series of investigations he conducted at the laboratories of the Massachusetts Institute of Technology, in which his efforts were mainly directed to the determination of the cause and nature of the transmission of metal from an electrode to a plate. According to the theory developed by Professor Hudson in consequence of his investigation, the function of the electric current is nothing more than that of furnishing heat in the form of the electric arc. The welding is accomplished by metal that is expelled from the electrode in the form of metallic vapor and minute liquid particles which are shot across to the plate opposite at the rate of some fifty a second. The force that propels these particles is the pressure that arises from the sudden formation of vapors and gases under the intense heat of the arc. Carbon monoxide is the gas mentioned, and the vapors are those of the lower-melting constituents of the electrode. The particles that strike fluid metal on the plate solidify with it; but those that strike solid metal either bounce off and are wasted, or adhere without fusion and are a cause of bad welding. One great advantage of maintaining a short arc, Professor Hudson observed, lies in the fact that it secures a better concentration of the projected particles within the fluid spot on the plate.

American Paper and Pulp Association

A committee report presented at the annual conference of the American Paper and Pulp Association, assembled in New York on November 14, contained a plan for the conservation of the United States forest capital, which, in the statement of the committee, is being used up faster than it is replaced. The suggestions proposed embraced:

1 A forest survey and land classification
2 A great enlargement of the public purchase of cutover lands for which ample precedent has been established in the East by both the Federal Government and by some of the states. The best interests of the country would seem ultimately to require at least twice the present area of public forests
3 A much more general extension of Federal coöperation with the states in fire prevention
4 The states should do much more than they now do in the way of fire control
5 The states, through the adoption of uniformly fair forest taxation laws, the establishment of forest nurseries, and the preparation of forest working plans, should offer every possible encouragement to the owner who wishes to grow timber on his land
6 Very properly the most immediate concern is the protection of the timber we already have, but wherever sufficient fire protection can be secured a large program of forest planting should be carried out.

In conclusion, the committee outlined methods of fire protection in the Northeastern States, and urged that immediate steps be taken to unite the professional foresters, the lumberland owners and the consumers of forest products upon a program of forest-fire protection and acquisition of cutover lands.

International Trade Conference

According to statements made by the trade representatives of the allied countries at the International Trade Conference, held in Atlantic City under the auspices of the Chamber of Commerce of the United States on September 30 to October 6, Europe will probably not require as much of American materials for its reconstruction period as it has been generally believed in the United States. Even before such requirements as the European nations may purchase in this country are finally provided, it will be necessary to find means of financing this business and extending credits over possibly a long period of years. Finance was concluded to be the crux of the entire international problem and the very thing upon which depends the reduction of the enormous trade balance piling up in favor of the United States. Great Britain, it was found, will not need much American assistance, except as this country can relieve her of some of the burdens of caring for the other European nations while Great Britain is engaged in settling her own problems. France, Italy, and Belgium need American aid and need it badly, but, as was emphasized by not only the visiting speakers, but by the American participants in the general program, this

assistance is not the kind required by weak, characterless nations, but by nations of strength and ability suffering from the ravages and privations caused by the war with Germany. Help will be given these countries, it was declared, — just how is not known, but help will be extended. This was made clear time and again in the addresses given by the business men of the United States.

American Iron and Steel Institute

The principle of the open shop as advocated by Judge Gary in the steel strike and before the industrial conference at Washington was enthusiastically indorsed by the American Iron and Steel Institute at its sixteenth general meeting, held in New York on October 24. Resolutions were formally adopted, in which the Institute recorded "its unqualified approval of Mr. Gary's firm stand against any infringement of the rights of the individual in labor or in business, rights fundamental to American industrial supremacy as well as to American liberty."

Recent applications of metal radiography were outlined by W. E. Ruder, research metallurgist of the General Electric Company, Schenectady, N. Y. He referred particularly to an experiment made in order to determine the thickness of the smallest air inclusion which could be distinguished radiographically. Two plates of steel were machined and ground to flat surfaces. In one of these a slot was cut to give a wedge of air of varying thickness. Each plate when finished was $\frac{5}{8}$ in. thick. The two plates were then bolted together and radiographed at a 15-in. gap. In this manner it was found that a 0.021-in. air inclusion could be detected at $1\frac{1}{4}$ in. of steel and a 0.007-in. air inclusion in a total thickness of $\frac{5}{8}$ in. of steel. This was, of course, under the most favorable conditions, when it was known beforehand that the inclusion existed and just where it was.

In a paper on Testing Steel by Magnetic Analysis, R. L. Sanford, associate physicist, United States Bureau of Standards, described a method for determining the degree of magnetic uniformity along the length of a specimen of substantially uniform cross-section, such as a rail. The test consists of surrounding the specimen with a magnetizing solenoid which is run along the specimen. A sensitive electrical instrument which is connected to a test coil carried with the solenoid indicates any change in magnetic permeability of the specimen as the coil moves along. The conclusions so far warranted are, according to Mr. Sanford, that a bar which is magnetically uniform along its length is also mechanically uniform, that a bar which is mechanically non-uniform along its length is also magnetically non-uniform and this non-uniformity will be surely indicated by the test; and finally that bars which are magnetically non-uniform may or may not be seriously defective from the mechanical point of view. The Bureau is conducting further investigations in coöperation with the ordnance department of the United States Army.

King Albert of Belgium attended the banquet as the guest of honor and gave a message of good-will and of appreciation of the American steel and iron industry. Another guest of distinction was M. Eugene Schneider, head of the Creusot works of France, and president of the Iron and Steel Institute.

Illuminating Engineering Society

The thirteenth annual convention of the Illuminating Engineering Society was held at Chicago, October 20 to 23. The report of the Committee on Progress expressed the hope that the reaction from the restricted lighting which war conditions compelled, either from the necessity of saving or conservation, would be in the direction of a demand for a higher standard of illumination, both indoors and out. "The results of higher illumination intensities in increasing factory production, as reported to this Society," continued the report of the committee, "are being recognized as evidence of the necessity for increasing the foot-candle values ordinarily considered satisfactory for this class of lighting. The Inspector of Factories in British Columbia has called attention to the desirability of better industrial lighting, and, that in many cases such as sawmills where electric generators are part of the equipment, the lighting is so inadequate that the inspector has had to be furnished with a lantern in order to see well enough to perform his duties." The records of improvement presented by the committee took up the progress made in the gas and electric fields in the development of fixtures for special illuminating purposes, industrial as well as scientific, standardization and the recent designs of powerful searchlights.

In a paper on Glare Measurements, Ward Harrison, Illuminating Engineer, National Lamp Works, Cleveland, Ohio, presented data showing the range of agreement in opinion among a number of observers as to the glare from bare lamps and other more diffuse light sources, in comparison with a reference source of variable intensity. The set-up consisted merely of a row of ten or twelve light sources of varying intensity, some bare lamps, some frosted lamps, and some lamps in globes or reflectors. All were lighted and the observer was asked to state which of the sources he deemed most objectionable from the standpoint of glare. The source named was then extinguished and he was requested to point out the most glaring of those which remained, and so on until but one was left burning. The unexpected feature of this investigation was that practically all of the observers asked to have the lamps turned out in precisely the same order; in fact, there were but three or four cases among fifteen observers where a difference of opinion existed as to the relative standing of any two light sources. Mr. Harrison concluded with a discussion of the practicability of making a rough classification of lighting installations into groups according to the sensation of glare as registered by a small instrument based on the method of comparison followed in his experiments.

Arthur H. Compton, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., described a photoelectric photometer. He noted the difficulties which heretofore have prevented the use of the photoelectric cells in routine photometry, and suggested the use of a thermionic amplifier to increase current readings, also a filter to reduce the proportion of blue light and render the indications proportional to the photometric value. With such equipment, lamps are compared by varying their distances to the cell, until the deflection of the galvanometer is the same as that given by the Standard lamp.

American Railway Bridge and Building Association

The American Railway Bridge and Building Association convened at Cleveland on October 21 to 23. Welcoming the association to the city, D. C. Moon, assistant to the federal manager of the New York Central at Cleveland, emphasized the necessity of exercising practical sense in applying the technical principles of engineering. "My personal observations and experience," he said in part, "led me long ago to feel that, as between the so-called practical 'horse sense' and the technical or book knowledge, I would select the man with the former qualifications for a majority of the jobs. One can buy books and technical knowledge, but he cannot buy brains. The purely technical man has usually proven a costly theorist, as many an employer has found out to his sorrow. But the practical man has moved along on safe lines and been the employer's benefactor. Strive to be a combination man in every sense, and with that you surely will be a success. Study formulæ and technique, for they must be used, but don't forget to keep your mind working on the practical side of every job."

Comparing the internal-combustion engine with the steam engine as source of power in a railroad plant, C. A. Lichty, of the purchasing department of the C. & N. W. Ry., said that while the cost of installation is about equal for either type in the small plants or may be even higher for the internal-combustion engine in installations of from 20 to 50 hp., nevertheless the oil engine is much more economical in the matter of attendance and operates more efficiently than the steam engine, and considerably less space

is required for the storing of the oil fuel than for the transportation and storage of coal. A wide difference of opinion developed in the discussion of Mr. Lichty's paper. E. A. Demars, of the Oregon Short Line, favored steam plants because they require less-experienced operators. He stated that he had found trouble in securing men sufficiently trained and experienced to operate and maintain gasoline engines. J. P. Wood, of the Pere Marquette Railway, stated that he had found gasoline engines to be more economical than steam for small stations. He employed section foremen to run engines at a number of minor points on that road and had found that they were able to do this work satisfactorily. In larger stations where standpipes are installed he favored steam plants, largely because of his practice of piping exhaust steam to the standpipe pits to prevent their freezing in extreme cold weather. C. R. Knowles, I.C. Ry., presented data showing the comparative costs of operating a gasoline station pumping 200,000 to 300,000 gal. of water per day — which was operated originally by steam and recently changed over to an oil engine—which showed a reduction in fuel cost of over $1000 per year under identical conditions. G. W. Andrews, of the Baltimore & Ohio, stated that there are a number of points on his road where gasoline plants are not practicable, as they are flooded at certain seasons of the year. He referred to one line of 100 miles on which there are five water stations which have been under water five times this year. He uses steam plants at these places in order that the stations can be operated even when under water. In general, he favored the use of gasoline engines for ordinary locations. Mr. Knowles and others pointed out the fact that oil-burning engines can be operated on lines subject to floods by placing the pumps in waterproof pits and locating the engines above the high-water level, this arrangement giving much higher efficiency than operating steam pumps under water.

The committee reports on painting metal railway structures and on the economical use and storage of fuel at railway pumping stations contained information of much interest and many valuable suggestions which can well be applied to similar practices outside of the railway industry.

Sir John Wolfe Wolfe-Barry

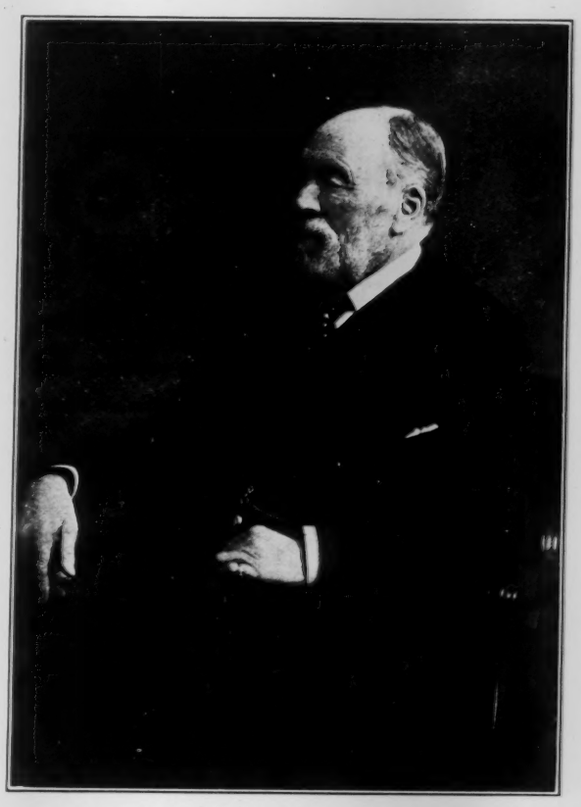
The accompanying portrait of Sir John Wolfe Wolfe-Barry was presented to the American Engineering Standards Committee by the British Engineering Standards Association, whose destinies he so ably guided through long years from its beginning in 1901 as a committee of nine. That committee inaugurated by Sir John has developed into the present Association which numbers some twelve or fourteen hundred members and over three hundred committees, covering all the branches of engineering and allied industries.

Sir John Wolfe Wolfe-Barry, K.C.B., F.R.S., was the doyen of the engineering profession of Great Britain. Past-president of many of the learned societies, he always took the greatest interest in the younger members of the profession and probably is more responsible than any other man for the status of engineering generally.

His father was the architect on the Houses of Parliament and the well-known Reform Club. He himself was more closely identified with transportation facilities than with any other branch of engineering and in this connection first place may be given to the railways in and around London. He was responsible for the work of carrying the South-Eastern Railway across the Thames into Charing Cross and Cannon Street Stations and also for the construction of Tower Bridge. For the latter work he studied and developed the bascult system for the opening span, determined, as the result of many experiments, the load which could be safely imposed upon London clay, and made careful observations on the subject of wind pressure. He was also chairman of the Arbitration Board which resulted in bringing about the Metropolitan Water Board of London.

Much of Sir John's time was devoted to dock construction and there are few ports in Great Britain or her colonies in which his influence as designing, executive, or consulting engineer has not been felt.

His death on January 22, 1918, ended a long and exceedingly active life. He contributed greatly to the commercial prosperity



SIR JOHN WOLFE WOLFE-BARRY

of the United Kingdom, advanced the science of engineering particularly in relation to transportation and helped to raise the profession to a higher status. Throughout his life, Sir. John showed a singleness of purpose in giving his time and experience for the general good of the community by serving on commissions and by utilizing every opportunity to inculcate principles whereby the natural wealth and physical energy of the nation might be economized.

Correction to Paper on Octaval Notation in Shop Measurements

In MECHANICAL ENGINEERING for November there appeared on page 871 an illustration with the caption —"Fig. 2 Simple Vernier Calipers." The illustration showed, however, a simple calipers

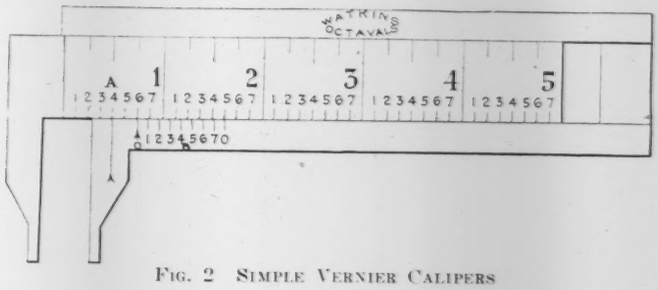


FIG. 2 SIMPLE VERNIER CALIPERS

to which reference was made in the complete paper, that appearing in the November issue being only an abstract. The correct figure is reproduced herewith.

ENGINEERING COUNCIL

Engineering Council[1] is an Organization of National Technical Societies of America, Created to Consider Matters of Common Concern to Engineers, as Well as Those of Public Welfare in Which the Profession is Interested

Classification and Compensation of Federal Engineers

Employed professional engineers have found themselves unprepared to meet the changes in economic conditions which have occurred during the last few years, but they are now endeavoring to bring about increases of compensation so as to sustain themselves according to previous standards of living and to adjust the hitherto inadequate salaries of positions to their responsibilities. To help correct these unfavorable conditions, Engineering Council organized, in April last, a Committee on Classification and Compensation of Engineers, of which Arthur S. Tuttle, Deputy Chief Engineer, Board of Estimate, New York City, is chairman.

The committee is divided into three sections — State and Municipal, Railroad, and Federal Government. The last-named of these, which is headed by John C. Hoyt as chairman, has just issued a preliminary report, which should receive the careful attention of every engineer so that the final report may serve as a basis for a rational system of classification and the establishment of adequate compensation for all branches of engineering.

Space prohibits more than a brief summary of the report, but it is the hope of the committee that many may see fit to offer their criticisms and suggestions, for it is highly important that every engineer interest himself actively in this subject, because the right solution of the problem is essential to the welfare of the individual and necessary in keeping the standards on a high plane.

Briefly the report indicates the lack of an adequate or consistent employment policy with respect to engineers and other technical employees in the Government service. This is shown by the following conditions, which are believed to be largely responsible for the unsatisfactory status of this class of Government employees:

1 Absence of any system of grading of positions.

2 Lack of uniformity in classes of positions and in their titles and duties.

3 Inequalities in compensation for positions of the same grade in different organization units.

4 Generally inadequate compensation for services rendered.

To the end that these conditions may be corrected and proper and equitable conditions of employment established for engineers, as well as for other Government employees, the following practices and principles are recommended:

1 Positions should be classified in accordance with the character of the duties to be performed and with the training and experience necessary for their performance, as indicated by a system of grading.

2 Within the salary limits fixed for each grade, there should be a system of advancement through the grade based upon experience gained in the position and upon proof of increase in the proficiency of the employee in performing the duties of the grade.

3 Promotions from grade to grade should depend upon the existence of a vacancy in the higher grade and proof that the employee is qualified to fill the vacancy.

4 The determination of adequate salary schedules should take into account and properly weigh the following basic considerations:

(a) The capital invested, both in money and in time, in obtaining the requisite fundamental training.

(b) The amount and character of experience and the degree of personal ability required.

(c) The relative value of the classes of work to be performed.

(d) The amount paid for work of a similar nature in private employment.

(e) The amount necessary to enable the employee to maintain a standard of living commensurate with the general standards of the community for positions carrying similar dignity and responsibility.

(f) The amount necessary to procure for and retain in the Government service a class of employees capable of conducting the business of the Government with an efficiency and a spirit of initiative equal to that of private business.

5 In the interest of an adequate social policy, no position likely to be occupied by individuals of an age to assume family responsibilities should fail to pay an amount sufficient to permit the maintenance of the average family in reasonable decency and comfort.

6 In the interest of the employees as a whole and of the proper conduct of the work of the Government, a system should be established by which employees who fail to maintain satisfactory standards of service should be removed, transferred, demoted, or retired as may be equitable in the circumstances.

Numerous tables and charts comparing salaries and grades of both past and present form an interesting and valuable part of the report, and one showing the tentative recommended salary schedule is reproduced below as Table 1.

TABLE 1 TENTATIVE RECOMMENDED SALARY SCHEDULE

	Titles of Positions	Minimum Years of Service in Grade	Minimum Salary of Grade	Maximum Salary of Grade	Total Promotion between Grades
	PROFESSIONAL GRADES				
1	Chief Engineer		8100	and up	2160
2	Engineer	4	5940	7860	1620
3	Senior Assistant Engineer	3	4320	5760	1620
4	Assistant Engineer	3	2700	4140	1080
5	Junior Assistant Engineer	2	1620	2580	
	SUB-PROFESSIONAL GRADES				
6	Aid	3	1680	2400	600
7	Junior Aid	2	1080	1560	

[1] Officers of Engineering Council: J. Parke Channing, *Chairman*; Alfred D. Flinn, *Secretary*, Engineering Societies Building, 29 West 39th Street, New York.

NATIONAL SERVICE COMMITTEE

Contributed by the Washington Office[1]

Engineering Appropriations, 66th Congress

A number of items of vital importance to engineers were included in the first deficiency appropriation bill. They are as follows: $2,950,000 for the prevention of forest fires; $175,000 for industrial research, industrial safety standards and standardization of scientific instruments at the Bureau of Standards; $250,000 for repair of naval vessels. The following items were changed in conference: Alaskan Railroad appropriation was reduced from $17,000,000 to $6,000,000; Army Air Service appropriation of $15,000,000 was entirely eliminated and the appropriations providing for 33⅓ per cent increase of pay for draftsmen in the Navy Hydrographic Office and engineers in the Coast and Geodetic Survey Office were also eliminated.

The Alaskan Railroad appropriation was reduced because $6,000,000 is all that will be needed during the current fiscal year and the balance of the $17,000,000 required to complete the work will probably be taken care of in the next regular Sundry Civil bill.

[1] Washington Office in charge of M. O. Leighton, *Chairman*, National Service Committee, McLachlen Building, 10th and G Streets.

The appropriation for the Army Air Service was eliminated because it was contemplated that this service will be cared for in the future by a regular appropriation bill covering this special subject.

The total amount appropriated under the provisions of the first deficiency appropriation bill was $29,461,035.85. This is a reduction of almost 50 per cent from the bill which was originally passed by the Senate.

Mileage Pay for Engineers

After the National Service Committee of Engineering Council announced that it was prepared to look after the interests of engineer officers who were required to travel long distances to their first stations but were never paid for such travel, a large number of letters giving evidence in the case were received and used as evidence.

Arrangements were completed whereby a bill was drafted to care for the engineer officers who had lost heavily on this score. This measure was approved by the Adjutant General, Chief of Engineers and the Chairman of the Military Affairs Committee of the House, but has not been reported to the House calendar because of press of other business before the Military Affairs Committee.

Assistance to Civilian Aviators

Bills have recently been proposed in both Houses of Congress, authorizing the Secretary of War to sell at contract prices, plus 10 per cent, gasoline, oil, and aircraft supplies to civilians in charge of aircraft who land on or near aviation stations. He is to promulgate rules for the distribution of this coöperation, but with the special provision that the amount so sold is to be limited to the immediate needs of the aviator to enable him to get to the nearest point where supplies can be purchased.

This, together with the weather bulletins provided the Air Service through the Weather Bureau and the maps that are being prepared by the Government to assist aviators, should be a boon to civil aviation. These things show a distinct attitude on the part of the Government to assist aeronautical development as much as possible.

Road Building for 1920

A total of $633,000,000 is now in sight for road-building purposes during the year of 1920. The Bureau of Roads arrives at this estimated total expenditure as follows: brought forward from unfinished work, $165,000,000; available from state and county taxes and federal aid, $273,000,000; one-fifth state and county bond issues not before available, $50,000,000; one-third unexpended balance of state and county bond issues, previously available, $45,000,000; available from new bond issues to be voted on during the remainder of 1919 and early part of 1920, $100,000,000.

The United States Geological Survey will assist the Bureau of Roads by stimulating the production of road-building material if they can obtain the funds that will be required for this purpose. It has now become apparent that unless greatly increased production of road-building material is secured in the near future, full advantage of transportation facilities as well as the funds that are available cannot be had.

According to the records of the Bureau of Roads each month breaks the record of new roads started and completed under the extensive road-building campaign of the state and federal governments.

Chamber of Commerce to Erect New Building

The Chamber of Commerce of the United States is preparing to erect a building in Washington, D. C., to serve as the permanent national headquarters. This building will be a large and dignified structure, and is designed to commemorate the part taken by American business and industry in the Great War. The site selected for this building is at the corner of Connecticut Avenue and H Street, just across Lafayette Square from the White House, the State, War and Navy and other Government buildings. Of dignified classical architecture, the building will be five stories high, and is estimated to cost $2,500,000. Mr. Cass Gilbert, of New York, is the architect.

Engineers are interested because Engineering Council is a member of the National Chamber, and as such, has the privilege of using all the facilities of the Chamber's offices in Washington for the benefit of its member societies. The site for the new building has been purchased, and a campaign to raise the balance of the funds needed is soon to be made. Engineering Council bespeaks the coöperation with the Chamber of such engineers throughout the country as can help. Harry A. Wheeler, vice-president of the Union Trust Company, Chicago, Ill., is the chairman of the Committee on Financing Building.

National Research Council Reorganizes Its Division of Engineering

The Division of Engineering of the National Research Council has recently been organized, and Prof. Comfort A. Adams, Dean of the Harvard Engineering School and a past-president of the American Institute of Electrical Engineers, is now chairman. He replaces Dr. Henry M. Howe, who formerly headed the Division, Dr. Howe having been made Honorary Chairman. Mr. Galen H. Clevenger still retains the vice-chairmanship.

The work of the Division is progressing along many lines, perhaps the most important of which is the investigation of the fatigue phenomena of metals. An agreement has now been reached by the University of Illinois, the Engineering Foundation, and the National Research Council under the terms of which Engineering Foundation is to give $15,000 a year for two years to carry on this work and the University of Illinois is to contribute the use of its laboratories and the services of Professor Moore, the chairman of the Division's Committee on the Fatigue Phenomena in Metals. The work will be done under the direction of the Division of Engineering. A report as prepared by the committee, and which summarized the available facts and theories relating to fatigue failure, and discussed some of the unsolved problems, appeared in the September issue of MECHANICAL ENGINEERING.

The relation of the Division of Engineering to other organizations engaged in research in the field of engineering is also receiving considerable study, to the end that the research work of the various societies and organizations may be properly coördinated. Eight national engineering societies are now represented in the Division, among them being The American Society of Mechanical Engineers, and in order to bring about a larger measure of coöperation other societies and organizations engaged in engineering research will shortly be invited to appoint representatives.

Research Work in Alloys

The Division of Industrial Research of the National Research Council is arranging for the formation of a coöperative association to plan and support fundamental reseaches in alloys. Although much valuable work has been done in this field by scattered investigators, there is no doubt but that a well-planned and coordinated effort under the general guidance of the National Research Council and composed of specialists representing both the manufacturers and the more extensive users of alloys can produce additional results of great importance. The success of other industries which have supported research on a coöperative plan, such as has been done by the National Canners' Association and the Malleable Iron Manufacturers, is evidence of this fact.

It is planned to create a special scientific staff composed of a Director and Assistant Director of Research and a group of scientific investigators and technical experts who will give their whole time to the work. To finance the organization each member of the coöperative association will pay $1000 a year, and all contributing members, who may be either alloy, manufacturing or using individuals, firms or companies, are to benefit alike by the results of the researches.

NECROLOGY

HENRY LAURENCE GANTT

Henry L. Gantt, an industrial engineer of national reputation and a former manager and vice-president of the Society, died suddenly on the evening of November 23 at his home in Montclair, N. J., of heart disease.

Mr. Gantt was born in Maryland in 1861. He received his B. A. degree from the Johns Hopkins University in 1880 and was graduated from the mechanical engineering course at Stevens Institute of Technology in 1884. In association with Frederick W. Taylor he helped to install modern methods of manufacture at the plant of the Midvale Steel Company and at other large industrial establishments. During the war, as production advisor to the Government, he developed a new and effective method for the rapid production of war materials.

Mr. Gantt was a member of the Society of Naval Architects and Marine Engineers, the American Geographic Society, the Engineers' Club and the Machinery Club. He became a member of our Society in 1888 and later held the office of manager (1908-1911) and that of vice-president (1913-1915).

A more extended account of Mr. Gantt's career will appear in the January issue of MECHANICAL ENGINEERING.

WILLIAM FRANKLIN AUSTIN

William F. Austin, a member of the Society since 1905, died on July 12, 1919. Mr. Austin was born on October 2, 1864, in East Greenbush, N. Y. He received his early education in the public schools of Rensselaer and later supplemented this by a correspondence course in mechanical engineering. He served his apprenticeship with the Central Bridge Company, Buffalo, from 1882 to 1884, when he became connected with the Hilton Bridge Company, Albany, first as foreman of their drafting room and later of the erection department. In 1894, Mr. Austin became superintendent of the Albany plant of the American Bridge Company, and in 1905 superintendent of the Eddystone plant of the Belmont Iron Works, where he was located for about eight years, when illness compelled his giving up active business life.

WILLIAM FRAZIER CARPENTER

William F. Carpenter, vice-president of the Pittsburgh Testing Laboratory, died suddenly on October 10, 1919. Mr. Carpenter was born in 1857 in Staten Island, N. Y. He was graduated from Stevens Institute of Technology in 1876 and took his first position with the Ramapo Iron Works. From there he went to Pittsburgh and started the Kent Construction Company and later the Pittsburgh Testing Laboratory. For a number of years he was associated with the Westinghouse and Electric Manufacturing Company, holding very responsible positions. He was also connected with the St. Lawrence Power Company as vice-president and general manager and acted as consulting engineer for the Spokane and Inland Empire Railway Company. He then returned as vice-president to the Pittsburgh Testing Laboratory, which concern he himself had established many years before.

Mr. Carpenter (who, in 1918, had his name changed from Zimmerman) was one of the original members of the Engineers' Club of New York. He became a member of the Society in 1884.

JOHN ARTHUR HALL

John Arthur Hall, a member of the Society since 1916, died on October 1, 1919, of injuries received in an automobile accident. Mr. Hall was born in Pittsburgh, Pa., on September 16, 1877. He was graduated from Sheffield Scientific School, Yale University, in 1897, and after a year of graduate study became associated as chemist with the Carnegie Steel Company, Pittsburgh. From 1902 to 1915 he was connected with the Tennessee Coal, Iron and Railroad Company, as superintendent of the Alice Furnaces, with the Edison Portland Cement Company as chemical engineer and with the Ransome Concrete Machinery Company as superintendent in charge of production. More lately, Mr. Hall has been engaged in business under the firm name of the Hall Machine Company, general machinists.

WALTER W. KREISER

Walter W. Kreiser was born on July 23, 1892, in Jersey City, N. J. He was prepared for college at Stevens Preparatory School and then entered Stevens Institute of Technology, from which he was graduated in 1916 with the degree of M.E. He spent a year in chemical research work and then became connected with the mechanical engineering department of the Western Union Telegraph Company, New York. In September 1917 he became assistant engineer of tests in the Brooklyn Navy Yard. Here, while performing his regular duties in the mechanical laboratory, he was injured by falling into a manhole carelessly left open, and, after an eleven-months' illness, died on October 11, 1919.

Mr. Kreiser was a member of the American Chemical Society. He became a junior member of our Society in 1916.

FRED A. LARKIN

Fred A. Larkin was born in Mason, N. H., on December 2, 1850. He was educated in Massachusetts schools and gained his technical knowledge through special instruction. He served an apprenticeship in shop practice, and for three years served as engineer in charge of engines and boilers in manufactories.

He then became connected with the Allis-Chalmers Manufacturing Company, Milwaukee, representing them in New York. For a number of years he was connected with the General Electric Company, and for two years was with the Foundation Company, New York.

Mr. Larkin was a member of the Engineer's and also of the Republican Club. He became a member of the Society in 1888.

JULIAN H. PITKIN

Julian H. Pitkin, a son of Judge Stephen H. Pitkin, was born at Lewiston, Ill., on July 4, 1839. When a boy, the family moved to Hudson, Ohio, and here he attended the Western Reserve College of which his grandfather, the Rev. Caleb Pitkin, was one of the founders.

He learned the machinist's trade and took a special course at the Polytechnic College of Pennsylvania, working for a year in some of the best shops in the East for experience. For several years he was with Altman Miller & Co., Akron, Ohio, in charge of the tool department. He then became connected with C. Altman & Co., Canton, Ohio, in a similar capacity. In 1886 he was called to the During Harvester Company, Chicago, Ill. (now a part of the American Harvester Company), where he held the position of assistant general superintendent in charge of manufacture, later being transferred to the experimental department.

During all these years of service, in addition to his regular duties, he was engaged in the design and perfection of new machinery. His efforts in these lines were honored by medals from Paris and the St. Louis Expositions.

Shortly after his retirement from the Harvester Company, the engineering department of the Civil Service of Chicago offered him the position of counsellor regarding plans and construction of new city shops. For many months he made a close study and inspection of plans and work, which resulted in a municipal plant as efficient as that of the most highly organized private corporation.

Mr. Pitkin was a member of several clubs and fraternal organizations, among these being the G. A. R. He was formerly a member of the Society, joining in 1883. — J. S. L.

BARTON J. ROBINSON

Barton J. Robinson, manager and proprietor of B. J. Robinson's Machine Works, Vicksburg, died on October 4, 1919. Mr. Robinson was born in Claiborne County, Miss., on February 14, 1868. He received his early education in the New Orleans Schools, and served his apprenticeship as a machinist with the Shakespeare Iron Works, New Orleans, later attending night school to perfect himself in his chosen trade.

In 1896, after spending a number of years in machine-shop and railroad work, he started in business for himself under the firm name of B. J. Robinson's Machine Works, specializing in rebuilding saw-mill and cottonseed-oil mill machinery.

Mr. Robinson was prominent in fraternal circles and belonged to several local business organizations and clubs. He became an associate member of the Society in 1917.

RICHARD CHARLES VIET

Richard C. Viet, head of the marine department of the Standard Oil Company, New York, died on August 29, 1919. Mr. Viet was born in New York City on November 17, 1855. He was educated in the public schools of the city, and when comparatively young secured employment with the firm of Rockefeller, Andrews & Flagler, the predecessor of the Standard Oil Company, with which concern he remained for fifty-two years. He was advanced from one position to another, gradually acquiring a comprehensive grasp of the oil industry. In 1880 he was made chief of the lighterage department at the time when the Standard Oil Company had its beginning. For many years Mr. Viet was a director of the company and in 1911 he became secretary.

Mr. Viet was affiliated with various philanthropic institutions, among these being the old J. Hood Wright Memorial Hospital, the American Museum of Natural History, the Metropolitan Museum of Art and the New York Zoölogical Society. He was a member of a number of clubs and social organizations. He became a member of the Society in 1891.

LIBRARY NOTES AND BOOK REVIEWS

AIR NAVIGATION. Notes and Examples. By Capt. S. F. Card. Longmans, Green & Co., New York, 1919. Cloth, 6 x 9 in., 140 pp., illus., tables, map.

An elementary textbook of navigation for airplane pilots, which presents the methods and the course of instruction used in training the officers of the British flying service.

APPLIED MECHANICS. By Fuller and Johnson. Vol. II. Strength of Materials. First edition. John Wiley & Sons, Inc., New York, 1919. Cloth, 6 x 9 in., 556 pp., illus.

Volume I of this textbook, treating of statics and dynamics, appeared several years ago. The present volume, treating of the strength of materials, covers the fundamentals of this subject, as taught in the engineering departments of the Massachusetts Institute of Technology, in so far as they are required in the study of structural and machine design and in the ordinary problems of engineering practice.

AUTOMATIC SPRINKLER PROTECTION. By Gorham Dana. John Wiley & Sons, Inc., New York, 1919. Cloth, 5 x 9 in., 456 pp., illus.

The author of this volume has attempted to cover the subject in such a way that his book may serve as a textbook for students and also as a reference book for experienced engineers. Starting with a historical summary of the development of the art, he then describes the tests and characteristics of sprinklers, installation rules, layouts, valves, supervisory systems, etc. An appendix lists all types on which information is available and summarizes over six thousand tests of various sprinklers.

CHILTON TRACTOR INDEX. July 1919. Published semi-annually by the Chilton Co., Philadelphia. Paper, 7 x 10 in., 500 pp.

This volume is a directory of the American tractor industry, in which, the editors state, they have attempted to present all the information useful to the industry as a whole. It includes descriptions of power-farm machinery, illustrated descriptions and specifications of tractors and farm implements, and directories of those firms manufacturing implements, tractors, parts, and accessories.

CONCRETE-STEEL CONSTRUCTION. Part I. Buildings. A Treatise upon the Elementary Principles of Design and Execution of Reinforced Concrete Work in Buildings. By Henry T. Eddy and C. A. P. Turner. Second edition. C. A. P. Turner & Co., Minneapolis, 1919. Cloth, 6 x 9 in., 502 pp., illus., tables.

The authors of this volume believe that the fundamental principles underlying the theory of reinforced construction are not generally understood by engineers and the methods of computation of applied bending moments in common use are erroneous. Their book presents what they believe to be the correct analysis of the bending and twisting moments present in columns and flat slabs, a method founded upon the manner of distribution and of the vertical shears that transmit the leading to the supports.

THE CONDENSED CHEMICAL DICTIONARY. A reference volume for all requiring quick access to a large amount of essential data regarding chemicals and other substances used in manufacturing and laboratory work. Compiled and edited by the Editorial Staff of the Chemical Engineering Catalog. The Chemical Catalog Co., Inc., New York, 1919. Cloth, 6 x 9 in., 525 pp.

This volume has been prepared to meet the need for a concise summary of the properties of chemicals, which is felt by exporters, brokers, purchasing agents, manufacturers, and others who require quick access to information on chemical products.

The arrangement of the book is alphabetical and, while the compilers state that no attempt has been made to be exhaustive but merely to give the outstanding facts concerning the chemicals ordinarily met in commerce, approximately six thousand substances are included.

DYKE'S AUTOMOBILE AND GASOLINE ENGINE ENCYCLOPEDIA. By A. L. Dyke. Tenth edition. A. L. Dyke (copyright 1919), St. Louis. Cloth, 7 x 10 in., 940 pp., illus.

It is difficult to imagine any topic connected with the use or repair of automobiles which is not discussed in this comprehensive volume for repairmen and operators. Theoretical considerations are omitted, but an immense amount of practical information is supplied in concise, definite form, illustrated by numerous drawings and charts. In addition to passenger automobiles, the volume treats of trucks, tractors, motorcycles, and airplanes.

FOUNDRY PRACTICE. A Textbook for Molders, Students and Apprentices. By R. H. Palmer. Second edition. John Wiley & Sons, Inc., New York, 1919. Cloth, 6 x 8 in., 390 pp., illus., 40 tables.

This volume is intended primarily for purposes of instruction, rather than as a treatise for experienced foundrymen. The various types of molds are explained and illustrations of the different practices are given. Cupola and air-furnace practice, foundry equipment, methods of mending and cleaning castings are also discussed.

This edition has been enlarged by the inclusion of methods for casting and holding a number of additional articles, such as engine cylinders, propellers, lathe beds, and large kettles.

THE GASOLINE AUTOMOBILE. Prepared in the Extension Division of the University of Wisconsin by George W. Hobbs and Ben G. Elliott. Second edition, completely revised by Ben G. Elliott and Earl L. Consoliver. McGraw-Hill Book Co., Inc., N. Y. Cloth, 6 x 9 in., 483 pp., 1 pl.

Developments in automobile practice during the past four years have necessitated changes in this popular textbook. In addition to the necessary revision, the book has been rewritten and enlarged by the inclusion of several new chapters. In doing this the authors have provided a work on the fundamental principles of automobile design, construction, and operation for the instruction of those who drive, repair, sell, or otherwise have to do with motor cars.

IRON AND STEEL. A Treatise on the Smelting, Refining, and Mechanical Processes of the Iron and Steel Industry, including the Chemical and Physical Characteristics of Wrought Iron, Carbon, High-Speed and Alloy Steels, Cast Iron and Steel Castings, and the Application of these Materials in Machine and Tool Construction By Erik Oberg and Franklin D. Jones. First edition. The Industrial Press, New York, 1918. Cloth, 6 x 9 in., 328 pp., illus.

This volume, the authors state, is not intended as a treatise for metallurgists and those engaged in the manufacture of iron and steel, but as a textbook for students in technical schools and those engaged in mechanical engineering and machine building. The book provides for these a broad general survey of the industry, with definite practical information on the various commercial grades and forms of iron and steel products, and the particular class of service for which each is suitable.

MARINE GAS ENGINES. Their Construction and Management. By Carl H. Clark. Second edition. D. van Nostrand Co., New York, 1919. Flexible cloth, 5 x 8 in., 136 pp., illus.

This volume is a small manual of convenient size, intended for those who desire a systematic presentation of the principles of operation and construction of the standard types of marine gas engines, from a practical rather than a theoretical point of view. The present edition has been revised to current practice, and material on oil and Diesel engines has been added.

MANUFACTURERS' INSTRUCTORS AND ADVISORS. By Frederick Meron. Theo. Audel & Co., New York (copyright 1918). Cloth, 3 vols. and portfolio.

Contents: No. 1 — Layouts and equipments for factories, 223 pages and portfolio of 34 plates. No. 2 — Common-sense working methods in factories, 161 pages. No. 3 — The human element in organizations, 351 pages.

The author endeavors to present concisely and clearly the results of his experience in the installation, organization, and operation of industrial plants, with the object of showing, by comparison and illustration, methods for increasing output and reducing expenses.

PAPERS ON THE DESIGN OF ALTERNATING-CURRENT MACHINERY. By C. C. Hawkins, S. P. Smith, and S. Neville. Sir Isaac Pitman & Sons, Ltd., London and New York, 1919. Cloth, 6 x 9 in., 392 pp., illus., plates, tables.

Contents: Notes on the Theory and Design of Alternating Current Generators; the Flux Wave-form of the Turbo-alternator with Cylindrical Rotor; Magnetic Calculations for Tapered Teeth; Notes on the Theory and Design of the Polyphase Induction Motor.

Originating out of many discussions on technical subjects, the papers here collected find a connecting link in their common purpose, which is to deal scientifically and practically with problems arising in the design of alternating-current machinery. The point of view throughout is that of the practical designer.

THE PRINCIPLES OF ELECTRIC WAVE TELEGRAPHY AND TELEPHONY. By J. A. Fleming. Fourth edition. Longmans, Green & Co., New York, 1919. Cloth, 6 x 9 in., 707 pp., illus., plates, tables.

Dr. Fleming's well-known treatise has again been revised by additions which bring it up to date, while antiquated matter has been deleted in order that the volume might not become unwieldy. The book is a statement of principles rather than a full account of actual apparatus, and is intended to provide a comprehensive view of the subject, particularly with regard to its scientific side, and of that part of it which is concerned with quantitative measurements and the underlying theory.

STEAM TURBINES. A Practical and Theoretical Treatise for Engineers and Students, including a discussion of the Gas Turbine. By James Ambrose Moyer. Fourth edition, revised and enlarged. John Wiley & Sons, Inc., New York, 1919. Cloth, 6 x 9 in., 496 pp., illus., diag., tables, 1 folded chart.

This edition differs from the preceding ones by containing fuller discussions of the methods of governing, the calculation of the strength of disk-type blade wheels, and of recent developments in marine practice. The text as a whole has also been revised. The general purpose of the volume is to provide the designer, operator, or manufacturer of steam turbines with a concise manual of information based on practical experience.

TIMBER. ITS STRENGTH, SEASONING, AND GRADING. By Harold S. Betts. First edition. McGraw-Hill Book Co., Inc., New York, 1919. Cloth, 6 x 9 in., 234 pp., illus., maps, charts, tables.

This volume, for engineers, manufacturers and users of lumber and wood material, is intended to meet the lack of a work on wood as a structural material, similar to existing handbooks on steel, concrete, etc. The methods of testing the strength of wood and wood products, such as telephone poles, packing boxes, and vehicle parts, are described and the results of numerous tests by the Forest Service are tabulated. A table based on 130,000 tests, showing the average mechanical properties of 124 American woods, is given. Proper methods of seasoning wood are fully discussed. The grading rules of the different manufacturers' associations are given and the book closes with extensive statistics on the lumber produced and used in the United States.

WATERPROOFING ENGINEERING. For Engineers, Architects, Builders, Roofers, and Waterproofers. By Joseph Ross. First edition. John Wiley & Sons, Inc., 1919. Cloth, 6 x 9 in., 452 pp., 140 illus., 41 tables.

The absence of any systematic treatise on waterproofing has led to the preparation of this book, which is based on the author's practical experience and researches, as well as his study of the existing literature. The function of waterproofing, the systems in use, methods, and results are described and specification and cost tables are given. A useful glossary of waterproofing terms and a bibliography are appended.

WAGE PAYMENT

(*Continued from page 940*)

every human activity can be scheduled and analyzed, yet by far the greater part of industrial operations can be treated in this way. The relatively few operations which cannot be classified and treated in this manner would be such a small part of the total that it would be easy to find a way to compromise when such exceptions should occur.

In estimating the value of operations we must drop, to a large extent, the idea that wage is the compensation for time. It should be made a compensation for product delivered. The value of the product changes constantly. Changes may be due to the desirability of the product, or to the means employed to produce the product, or to the law of supply and demand, or to other causes. In other words, the relations existing between various products is ever changing; consequently, whatever estimate is placed on the value of the product of labor should be changed from time to time, so as never to have too large a difference between the actual and the estimated value.

It hardly need be pointed out that to set such standards of value of work must necessarily be a gigantic task. In addition to the many technical difficulties in estimating values of products, there are other elements which must not be forgotten. There are many cases where operations are required which call for extreme skill, possessed by only a few, a skill which can never be found in the mass of the people. There are operations where steady nerves are essential, some where physical courage is required, others which cannot be successfully carried out without many years of experience, et cetera. Such points should all be considered.

Consideration should also be given to what constitutes a proper minimum and a proper maximum wage. In repetition operations it is sometimes possible for the operator to produce large amounts of work, but only at the expense of extreme weariness, and in the long run such a man is not employed to the best advantage of the world at large. Recognition of this fact has led to the prescription of rest periods. On the other hand, there may be cases where it is expedient to employ men not skilled in the operation they are supposed to do. This may happen because skilled men are not available at that time or at that place, or because special conditions call for an unusual amount of this class of work. Though the value of the product of such a man might be low, he should receive not less than a minimum wage. This minimum wage, however, is in itself difficult to determine. A satisfactory minimum wage for an unmarried young man is not at all satisfactory for a married man with a large family.

It is really superfluous to point out the many disturbing factors acting against the establishment of wages in proportion to product. What the writer wishes to emphasize is his belief that, notwithstanding all the difficulties, it will be found possible to classify a large portion of the work of the world in such a manner that wages can be set to such a degree of scientific accuracy that the variations caused by the disturbing facts will not be so large but that they will lend themselves to compromise. It is further his belief that such a classification cannot be accomplished by the employers alone, nor by the laboring men alone, but that when these two classes are working together for a constructive purpose, they will find so many things in common that they will be more apt to forget their differences. Finally, he wishes to state once more this belief: That the real cause of the present-day unrest lies in the fact that there is no unit of measurement which both employers and employees can use; or, in other words, the fact that our present wage system is not based on knowledge and justice, but only on guesswork and on the fear that the one may "do" the other.

In two parts—Part 2

MECHANICAL ENGINEERING

THE JOURNAL OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

Volume 41 February, 1919 Number 2

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications and positions listed below combine the services of the Society, and of the Engineering Societies Employment Bureau, Room 903, Engineering Societies Building.

POSITIONS AVAILABLE

Stamps shoul be inclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society records.

DESIGNING MECHANICAL ENGINEER: high grade technical man wanted to take charge of design, thoroughly experienced in design of cranes, coal and ore, handling bridges and towers; coal screening and sizing equipment, shipbuilding and wharf cranes, coal tipple equipments, conveying machinery, etc. State education, nationality, salary desired. Information confidential. Location, Canada. B-0879.

STEAM TURBINE DRAFTSMEN, capable of doing development and improvement work. Give full information as to training and experience when writing. New England concern. B-0880.

EXECUTIVES with engineering training in the manufacture of gears, transmissions, radiators and roller bearings, especially for automobile use. Men with at least 2 years' experience. State age, experience, references and salary expected. Good opportunity for right man to take hold of new industry in Canada and to show his ability as engineer and producer. B-0891.

GENERAL FOUNDRY FOREMAN: must be thoroughly experienced in foundry practice, particularly with regard to making stove-plate and furnace castings; preferably man between 35 and 40, good executive, to take charge of plant employing on an average of 200 molders. Excellent permanent position for right man. Good salary. Apply by letter; give full information. B-0892.

MECHANICAL DRAFTSMAN having considerable experience on Diesel engines, particularly those of the stationary type. Location, Brooklyn. B-0895.

YOUNG ENGINEER on mechanical and electrical engineering work consisting of layout and design, in connection with boiler rooms, generating station bus work, switchboard, etc., and outdoor substations. Man who has had from 2 to 5 or 6 years' experience along power-house and substation drafting, operating or manufacturers' testing experience. Salary depends on the experience and ability of man, from $100 to $175. Location, New York. B-0896.

DRAFTSMAN for general, varied work, a good portion of mechanical drawing, some of which might be preliminary designing of machines or parts, or making working drawings for repair parts. Location, Georgia. B-0897.

Please mention MECHANICAL ENGINEERING, known as the Journal of The American Society of Mechanical Engineers, in your reply.

CHIEF INSPECTOR, technical expert, for valve department of company manufacturing high-pressure steam and ammonia valves. Must have had shop experience, preferably in valve work or in other steam specialties; also with valves in modern power-house operation, where high pressure and superheated steam is used. Location, Chicago. B-0898.

DESIGNER for tire-manufacturing company. Location, Hartford, Conn. B-0899.

SEVERAL YOUNG TECHNICAL ENGINEERS willing to enter rapidly growing Government Bureau. Some knowledge of power plants and building construction desirable but not absolutely essential. B-0900.

SEVERAL YOUNG MEN in engineering department of manufacturer of recording meters and power-plant equipment. Prefer those having technical training in mechanical engineering. Position offers good inducements, experience and future. Location, New England. B-0901.

EDITOR for responsible position, preferably native of United States and graduate from one of the leading technical colleges, who after graduation has had a large and varied experience professionally in the Latin-American fields and then returned to this country. Must be a successful engineer, thoroughly familiar with the Spanish language and with a broad first-hand knowledge of engineering problems in South America and other Latin-American countries. Salary $6,000 to $7,000 per year. Headquarters, New York. B-0902.

Please mention MECHANICAL ENGINEERING, known as the Journal of The American Society of Mechanical Engineers, in your reply.

SALES MANAGER for manufacturing concern making an established line of tools and other articles. Position requires thoroughly experienced, competent sales manager, preferably a technical, university graduate. Must be capable of organizing and conducting selling campaigns and securing a force of competent sales engineers. Only the best qualifications will be accepted. Output of concern capable of unlimited expansion, domestic and foreign. To the right party a congenial and splendid position is open. Concern's capital, $500,000. To save time make your first letter complete with your characteristics, business history, references, qualifications, etc. Location, New York State. B-0903.

COMBUSTION ENGINEER who has had sufficient experience to take charge of a 20,000 hp. boiler room, at a salary of approximately $3,000 per year at the start. Location, Ohio. B-0904.

PLANT AND PRODUCTION SUPERINTENDENT, mechanical engineer, having operating experience in power plants including electrical power equipment. Man above average height preferred. Must have poise and ability to secure team work throughout plant. $50 per week when services commence and interest in profits which within about 2 years should make income $75 to $100 weekly and increase later. Location, Newark, N. J. B-0905.

GENERAL MANAGER for company manufacturing scientific instruments, employing about 250 men; one who understands modern methods of manufacture, as well as financial responsibilities. It is intended to start man as works manager, and advance him to position of general manager having charge of the entire business. Salary will depend very largely upon the man. Firm is well established, good financial backing, and excellent reputation throughout the country. B-0906.

Please mention MECHANICAL ENGINEERING, known as the Journal of The American Society of Mechanical Engineers, in your reply.

ENGINEER OR DRAFTSMAN with experience in designing high vacuum, steam-air ejectors. Location, New York section. Name confidential. B-01.

SEVERAL GRADUATE ENGINEERS, experienced in testing and process investigation, particularly with despect to steam and power costs, for established company manufacturing soap and edible products at several plants. Name confidential. Location, Middle West. B-02.

EXPERIENCED MAN, capable of qualifying for position in charge of drafting room, for same concern as B-02. Name confidential. Location, Middle West. B-03.

TECHNICAL GRADUATE for engineering department of large concern manufacturing pumps, air compressors and condensers; live, energetic fellow with pump experience and sales ability preferred. Location, Middle West. B-05.

MECHANICAL genius of the sort that made New England famous all over the world, whose experience has been principally in machine design of apparatus like sewing machines, automatic wire-forming machines, typewriters or automatic watch-making machinery. An American, and preferably one under thirty; knowledge of electricity not necessary. Willing to start the right man in at $3,000 per year, and what the future may bring will obviously depend on the man. B-06.

DETAILED DRAFTSMAN. A young man who would grow into value. Location, Pennsylvania. B-07.

PLANNING-DEPARTMENT ENGINEER with sufficient shop experience to be able to intelligently lay out work, and with executive ability to see that the work is carried out by foreman. An expert systemizer in the six to eight-thousand dollar class is not wanted, but a man at 40 to 50 dollars per week. Location, New Jersey. B-08.

HIGH GRADE ENGINEER with experience in conveyors and handling plants and machinery for materials of all kinds. Men experienced in interviewing and advising prospective clients and supervision of designs. Headquarters in England. Name confidential; apply by letter. B-09.

TOOL AND JIG DESIGNERS; opening in engineering department for good man. Location, Iowa. B-010.

DISTRICT SALES MANAGER for New York office and for supervision of Philadelphia and Boston offices. Headquarters, New York. Should be good executive, thoroughly familiar

with modern sales methods and experienced in power-plant and combustion-engineering work. Technical graduate. B-011.

TWO TECHNICAL GRADUATES AS SALES ENGINEERS, to be located in the East. Should be good executives, thoroughly familiar with modern sales methods and experienced in power-plant and combustion-engineering work. Technical graduate. B-012.

ASSISTANT TO MASTER MECHANIC; progressive paper and pulp-manufacturing concern in Canada offers excellent opportunity to capable man, preferably experienced in papermill lines, with college and technical training and executive ability. B-013.

Please mention MECHANICAL ENGINEERING, known as the Journal of The American Society of Mechanical Engineers, in your reply.

ASSISTANT TO HEAD OF PURCHASING DEPARTMENT; progressive paper and pulp-manufacturing concern in Canada offers excellent opportunity to capable man, preferably experienced in paper-mill lines, with college and technical training and executive ability. B-014.

CAPABLE YOUNG MAN with some experience for general testing of boilers and turbines, looking to their more efficient operation. Work would consist of boiler tests to determine most efficient operating points; suitable fuel, desirable arrangement of baffling, etc., and also periodical turbine tests to check water rate curves and determine most economical loads, as well as impairment of condition of blading. Salary $1,800 a year to start, with ample opportunity of advancement to a man who can make good. Location, Iowa. B-015.

STAFF MEN wanted by an up-to-date corporation. Must be high-grade men capable of supervising the planning of production factory schedule, and collecting reports. State age, education, experience, references, and salary expected in first letter. Location New England. B-016.

MECHANICAL ENGINEER wanted for cement mill, location Kansas, must be technical graduate and have had previous cement-mill experience. Opportunity for advancement. Give age, previous experience, and salary expected. Apply by letter. B-017.

INSTRUCTOR in mechanism and machine design. Location Hoboken, N. J. B-018.

PROFESSOR OF MECHANICAL ENGINEERING for a well-known college in the middle west. Administrative ability and successful teaching experience required. Salary $3000. B-019.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 12th of the month, and the form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

GRADUATE MECHANICAL ENGINEER, 5 years' experience, business and engineering, in automotive work, desires position in tractor or other automotive industry as purchasing agent or office executive. 29 years of age, married. Will be released from Ordnance Dept. Jan. 20. B-115.

WORKS MANAGER, or position of equal responsibility. At present Captain in Ordnance Dept., expecting to be relieved soon. Years of experience in mechanical work. Particulars given on request. B-116.

TECHNICAL GRADUATE, age 29, experience on internal-combustion engines, gas producers, steam pumps, air compressors, electric motors and generators, artificial gas plants, and natural-gas distribution, desires position as sales engineer in Middle West or South. B-117.

ENGINEERING SALESMAN OR SALES MANAGER, Captain, Ordnance, who has been successful as works manager and sales engineer of large shop, desires position for sales work on power-plant equipment, machine tools or other engineering equipment or material. Will be discharged from Army in few weeks. B-118.

INDUSTRIAL OR CHIEF ENGINEER, position as master mechanic with future advancement considered. Age 30, married. Initiative, possesses executive ability. Broad experience in the design, construction, operation and maintenance of general industrial works, by-product coke plants, gas and chemical plants. Thoroughly familiar with foundation and poling work; selection of proper type, location and construction of masonry and steel buildings; structures of clay and silica fire brick; steam, gas, water, acid and other pipe lines; elevating, conveying and power transmission machinery; machine shop tools and equipment; pump, engines, turbines, compressors, boilers and power generating apparatus. Have been employed in consulting capacity on the design, construction and reconstruction of large industrial properties. Salary $4000 to $4500. B-119.

MECHANICAL ENGINEER, graduate 1917, desires permanent position in New York or vicinity. At present in the service. Twelve months' experience inspecting highly-specialized parts. Has been in complete charge of inspection forces. B-120.

PRODUCTION ENGINEER, experience covers textile machinery, coal mines, steel mills, food plants and shipyards. B-121.

MECHANICAL ENGINEER, technical graduate, age 29, married, with 5½ years' experience along general mechanical engineering lines, 4½ years with present employer. Desires engineering position with well-established company having good future opportunities. Prefer location in East or Middle West. B-122.

INDUSTRIAL MECHANICAL ENGINEER, age 32, married, desires change with reliable concern. Will consider small investment with growing enterprise. Practical and theoretical, master of the essential and practical details of designing, manufacturing and inspecting of tools, gauges, fixtures and special machinery; knowledge gained through work as chief engineer in present position. Inventive ability, good executive and familiar with office routine. B-123.

Please mention MECHANICAL ENGINEERING, known as the Journal of The American Society of Mechanical Engineers, in your reply.

ENGINEERING DRAFTSMAN, age 23, technical graduate, 7 years' experience on industrial and power-plant design, brass electric furnaces, reinforced concrete, structural and mechanical designing, piping, machinery layouts. Available Jan. 15, 1919. Will go anywhere. B-124.

EXECUTIVE ENGINEER, with initiative and foresight, seeks permanent position as manager or assistant manager, or superintendent. Broad experience in mechanical, civil and electrical lines, involving shop work, drafting, design, inspection, reports and plant operation. Technical graduate, age 44, married. At present completing construction of a power station for a prominent engineering and construction company. Available February or March. Salary $4,500 to $5,000. B-125.

WORKS MANAGER OR CHIEF ENGINEER, until recently connected with America's principal gun and shell plant, seeks position where his ability and experience would command a salary of $9,000 to $10,000 yearly. Two years with one of Detroit's largest automobile manufacturers, 15 years chief engineer and works manager for concerns engaged in the manufacture of standard machines and interchangeable parts. Experience covers all branches of machine shop, forge and foundry work in brass and iron; also efficiency planning and plant engineering. B-126.

PLANT ENGINEER; 12 years' experience plant maintenance and construction, 5 years with present employers, manufacturers of machinery. In charge of power, new construction, repairs of buildings, machinery repairs, installation, lighting, heating, plumbing, janitors, watchman and fire protection. Age 40, American. Wishes similar position. Will furnish experience and references to anyone interested. B-127.

MECHANICAL ENGINEER AND SUPERINTENDENT desires position with construction or manufacturing firm. Ten years' experience on construction work, in charge of design, erection and operation of equipment, buildings and power plants for firm of consulting engineers; 2½ years as inspector of steel and war supplies for British War Mission; 12 years' previous experience in machine shops and in charge of steam plants. B-128.

MECHANICAL ENGINEER, engineer of works, technical graduate, age 34, married. Twelve years' experience drafting and design, technical correspondence, plant lay-out and equipment and maintenance. Ability as sales engineer. Experienced in general manufacturing, steam engines and boilers, chemical works, factory buildings. Salary $225 month. B-129.

MANAGER, CHIEF ENGINEER, OR GENERAL SUPERINTENDENT, age 33, 19 years' experience, including machine-shop practice, design manufacture, construction of stationary and marine crude oil engines, high-grade special and automatic machinery, seeks permanent position. Minimum salary $6000 to start. B-130.

DESIGNING ENGINEER, age 28, married, technical graduate, three years' experience installation of mining and pumping plant machinery, last four years designing and developing aeroplane motors and aeroplanes. Can furnish the best of references. Desires to connect with aeroplane company or concern developing high-grade motors, as assistant chief engineer or chief draftsman. Present salary $3120. Will go anywhere. B-131.

MECHANICAL ENGINEER, 16 years' experience design, construction and operation of power plants, industrial building construction and familiar with the design and construction of chemical apparatus. Three years' experience in design, construction and maintenance of machinery for manufacture of explosives. B-132.

EXECUTIVE SALES ENGINEER, age 28, married, graduate mechanical engineer, now first lieutenant Ordnance Dept., supervising inspection of ordnance material in Middle West. Desires to connect with concern as executive or sales engineer manufacturing boilers, stokers, automatic grates or coal firing apparatus. Excellent experience in locomotive construction, combustion, boilers, inspection and sales. Expects to be released from army within next few months. Salary $3000 to start. Eastern location preferable. B-133.

POWER ENGINEER, age 32, married, technical graduate, 8 years' experience in steam power-plant operation and construction, and in electric transmission. Recently superintendent of power for mining company. At present in war work. Available January 20. B-134.

GRADUATE M.E., army officer, single, age 30, with eight years' experience in industrial power problems, combustion engineering and the design, construction and operation of steam power plants, desires location in an executive capacity. Expects to be released from the army about March 1, 1919. Prefer location in United States. Previous salary $3300. B-135.

PRODUCTION OR EFFICIENCY ENGINEER. Graduate M.E., age 26. Experience as time-study man, production and efficiency engineer, draftsman, designer and machinist. Location Middle West preferred. B-136.

MECHANICAL ENGINEER OR CHIEF DRAFTSMAN, mechanical and electrical engineering graduate, now employed by Shipping Board, desires permanent position with concern that can offer good future prospects, which is of more importance than present salary. Twelve years' experience on marine work, particularly experienced in design of reciprocating steam and Diesel engines and auxiliaries. B-137.

Please mention MECHANICAL ENGINEERING, known as the Journal of The American Society of Mechanical Engineers, in your reply.

TECHNICAL GRADUATE, twenty years' experience in the design, construction and operation of electric-lighting and street-railway systems, desirous of reëntering same line of work. Now in war work. Will go anywhere. B-138.

INSTRUCTOR in mechanical drawing and machine design now available. Fourteen years' experience designing and drafting on tools and machinery; two years in charge; also successful teaching experience. B-139.

INDUSTRIAL ENGINEER, age 26, now in the service, desires position in small progressive manufacturing plant as assistant to superintendent or general manager. Since August 1917 on duty with regular army engineer regiment, now in France. Present rank Captain, with duties of regimental supply officer. Before entering service was industrial engineer

with Crex Carpet Co., St. Paul, Minn. Prefer location in East. B-140.

PRODUCTION, EFFICIENCY ENGINEER, technical graduate mechanical engineering. Experienced in all kinds of bonus, premium and piece-rate systems; also labor-saving devices, jigs, fixtures, routing, planning and lay-out. Desires position with progressive manufacturing concern. Age 26, married. B-141.

CHIEF DRAFTSMAN, soon to be released from military service, desires connection as chief draftsman, asst. chief draftsman or sales engineer, brass or steam-goods line. Technical graduate, married, 6 years' experience, sales and engineering. B-142.

FOREIGN REPRESENTATIVE. M.E. and E.E. U. S. citizen, European education, with 15 years' American experience in largest manufacturing plants as general foreman, assistant superintendent and superintendent; desires to represent American industry exporting to Europe either raw materials or finished products. Location in Holland or Switzerland preferred. Thoroughly familiar with English, French, German and Dutch languages and business conditions. First-class business relations in above countries and in possesion of small private capital. B-143.

MECHANICAL ENGINEER, with several years of practical experience in steam engine, locomotive and pump works, and for the past 17 years as head of mechanical engineering in prominent university, desires responsible position, either in educational, commercial or industrial engineering. Can report at once if necessary. The best of references will be furnished. B-144.

GRADUATE MECHANICAL ENGINEER, recently discharged army officer, with one year's experience in construction and 2 years' on electrical and mechanical apparatus, seeks position with consulting or contracting mechanical engineer, engaging in power, industrial or refrigerating-plant work. Prefer location in New York City. B-145.

MECHANICAL ENGINEER, Captain in the army, technical graduate, age 30, desires position affording opportunity for exercise of executive ability. Experienced in design and construction of industrial plants, power plants and power-plant equipment; fuel economy; able to handle men; good general business training. Available at once. Salary $3500. B-146.

SALES ENGINEER, mechanical engineer with 8 years' experience in shop work, power-plant equipment and salesmanship, desires executive position in the home or district office. Recently honorably discharged from commission in army. B-147.

TECHNICAL GRADUATE, in mechanical engineering, with 3 years' experience in shop and drawing room. Age 27. At present Ensign in Naval Reserve. Prefer location in East. B-149.

MEMBER, now occupying executive position, desires to change. Number of years' experience in power-house design, water-tube boiler and furnace design, estimating and management of large manufacturing plant. Would consider agency in New York for power-house equipment. Prefer location in New York City or vicinity. B-150.

ASSISTANT TO PRODUCTION ENGINEER. American, age 24, technical graduate, degree of M.E. Two years' experience as mechanical draftsman, design. Familiar with wood and metal-working tools, graphic methods of production control; had responsible charge of war work relative to manufacture of airplane propellers, supervision of manufacture, writing reports, working plans, analysis of test date and work on forest products. B-151.

Please mention MECHANICAL ENGINEERING, known as the Journal of The American Society of Mechanical Engineers, in your reply.

MECHANICAL ENGINEER, technical graduate, age 32, married, with 6 years' experience in construction, operation and testing of large central stations, desires position with strong company where results count. B-152.

MECHANICAL ENGINEER, 20 years' experience as shop foreman, master mechanic, chief draftsman, chief engineer, specialty-tool design and interchangeable production. At present in Ordnance Department. Desires connection with progressive concern offering prospects of future advancement. Will go anywhere. B-153.

SALES EXECUTIVE, or Sales Engineer, age 42, for a quality or service proposition, having pronounced engineering features, to be marketed on an ultimate cost basis, who has produced results in this field, desires connection where competitive sales methods, with devices of merit, have not proven entirely satisfactory. $4000. B-154.

ENGINEER, executive or designing, technical graduate, conscientious, thorough and energetic, with 20 years' experience, including design, construction, operation and maintenance of industrial plants; layouts, estimates, appraisals, equipment, tests, efficiencies and economies. Thoroughly competent on general mechanical engineering problems from drafting room, shop or field standpoint. Available February 1. $4000. B-155.

MECHANICAL ENGINEER; Cornell M.E. graduate, age 28, 6 years' experience in inspection and testing of boilers, stokers, pumps and all types of mechanical and electrical equipment, desires to become connected with firm offering opportunity for future advancement. Prefer location New York. Salary $2000 per year. B-156.

SUPERINENDENT OR WORKS MANAGER, American, age 43, with 22 years' practical experience in large organizations and modern methods of operation in the production of automatic, semi-automatic and single-purpose machines, also the economical manufacture of interchangeable parts from small ball bearings to large machine-tools. Technical education, ability to handle men; able to successfully fill positions of machinist apprentice, toolmaker, general foreman, chief draftsman, superintendent and works manager. Eastern location preferred. B-157.

CHIEF INSPECTOR AND ENGINEER OF TESTS, single, age 25, M.E. graduate, with several years' experience in manufacturing of steel and steel products, desires position with engineering concern for duty abroad. At present with Ordnance Department. Available March 1. B-158.

Please mention MECHANICAL ENGINEERING, known as the Journal of The American Society of Mechanical Engineers, in your reply.

PRODUCTION ENGINEER, age 27, graduate mechanical engineer, four years' machine-shop experience; three years' in supervising and following up production, including routing and scheduling of work, and controlling the production of each part one year as head inspector. Prefer location Philadelphia or vicinity. B-159.

EXECUTIVE ENGINEER desires position with large firm as mechanical engineer, power engineer, or as executive for engineering export Company. Technical graduate, 14 years' experience in design, construction, maintenance and operation of steam plants; substations; transmission lines; purchasing mechanical and electrical and equipment and material according to improved methods. B-160.

EXECUTIVE ENGINEER, married, age 30, now officer commanding one of largest explosive and ammunition depots in country, desires connection with reputable manufacturing organization where sound business judgment is required, with opportunity for advancement, preferably a chance to later acquire an interest in the business. Mechanical engineering graduate two leading universities. Over 7 years' successful business experience; 5 years' shop work and sales engineer, 1 year in sales company, 18 months in army on assignments entailing executive management. Available in few weeks. B-161.

MECHANICAL ENGINEER, Executive, Chief Engineer, or in advisory capacity. Desires to connect with industrial or power plants whose fuel bills are large and whose cost of operation is high. Technical graduate, 5 years' shop experience and 20 years' practice in design, construction and operation of industrial and power plants, specializing in fuel and steam engineering. Recently employed by Government on the solution of problems of smokeless combustion and efficient fuel burning relative to submarine warfare. Willing to begin at modest salary, future remuneration to be dependent on results obtained. B-162.

MANAGER, GENERAL SUPERINTENDENT OR SUPERINTENDENT. Industrial engineer, American, age 42, 21 years' broad experience covering design, manufacture, construction and operation, appraisal and investigation, cost analysis, purchasing and management, special machinery in manufacturing machine shops, covering engines, boilers, overfeed and underfeed stokers; kilns, dryers and metallurgical furnaces, pumps, condensers, evaporators and distillers; mining, conveying, transmission and process machinery; machine shop, power, water works, cotton-seed oil, cement, hydrated lime and chemical-plant design; operation, construction and direction during past 10 years; at present on large Government plant construction. Seeks responsible permanent connection. Salary minimum $6000 per year to start. B-163.

Please mention MECHANICAL ENGINEERING, known as the Journal of The American Society of Mechanical Engineers, in your reply.

MECHANICAL ENGINEER, age 43, desires executive position; 25 years' experience in highest class of work on manufacture, processing and designing. Familiar with modern ideas of factory management. Highest references. B-164.

MECHANICAL ENGINEER, Tufts 1915, married, age 27, desires connection with reliable export house in New York City. Possesses varied manufacturing experience, as well as six months as sub-head of engineering department of large export house. Just released from navy as approvals officer, aircraft plant. B-165.

FOREIGN ENGINEER OR REPRESENTATIVE, age 41, married, technical graduate in mechanical engineering, desires position in Mexico or South America; 15 years' experience in engineering work; 3 years' experience in Mexico. Speaks Spanish and knows the Mexican customs. B-166.

MECHANICAL AND ELECTRICAL ENGINEER, with degrees, Lieutenant-Commander Naval Reserves, serving as engineer in large shipyard, will shortly be available for responsible position requiring engineering knowledge and business ability. Married, 16 years' experience in technical and commercial engineering. Position requiring continual travel not desired; foreign service no objection. B-167.

GRADUATE MECHANICAL ENGINEER, broad experience in executive, selling and financial work. Seven years' buyer of supplies for the Allies, export department, J. P. Morgan Company. Thorough knowledge of advertising and publicity. Prefer location in New York or Boston. B-168.

MECHANICAL ENGINEER, technical education, course in business administration, desires position of technical executive or assistant manager. Would consider sales engineering. Pleasing personality. Good references. Married, age 37. Eleven years' experience in engineering and manufacturing in the steel and furnace industry. Familiar with heat treating problems and processes. Prefer location Middle West. Salary about $5000. B-169.

EXECUTIVE: graduate mechanical engineer, age 31, desires connection with large industrial concern as assistant general manager or as sales engineer. Will soon be relieved as assistant manager of important division of Ordnance Department. Present position has necessitated close study of organization and equipment of industrial plants. Formerly mechanical engineer for State Industrial Commission. Thorough knowledge of power-plant design, construction and operation; selecting and rating of employees; modern business methods, including organization, management, sales, advertising and accounting practice. B-170.

ENGINEERING EXECUTIVE. Graduate M.E. Cornell University, with 5 years' teaching experience at that institution and 4 years' at the University of Wisconsin, as assistant professor. Desires executive position, preferably with manufacturing concern in Connecticut or vicinity. Married, age 36, 27 months' experience in all phases of production work connected with manufacture of firearms; 11 months as production engineer. Salary $3500 to $4500, depending upon location and opportunities. Excellent record and credentials. B-171.

INDUSTRIAL EXECUTIVE, age 42; married, desires to connect with concern within a radius of 300 miles of New York City, as superintendent or general foreman; 22 years' experience in machine shop and manufacturing work, including special machinery and tool making, as foreman, instructor, safety engineer and supervisor. B-172.

SUPERINTENDENT OR WORKS MANAGER, age 42, married; 18 years' practical experience, 7 years as executive head of plant manufacturing medium weight mechanical and electrical apparatus, highly developed as to interchangeability. Experience covers complete system of cost, stock and production control, layout and installation of equipment, design of special tools and machinery for economical production. Good estimator and can analyze machine operations, due to well-grounded knowledge of most modern shop practice covering foundry, machine, pattern, polishing, plating, finishing and all operations from purchase of raw materials up to, but not including, sales. Minimum salary to start. Prefer location near New York. B-173.

Please mention MECHANICAL ENGINEERING, known as the Journal of The American Society of Mechanical Engineers, in your reply.

MECHANICAL OR WORKS ENGINEER, technical education, age 36, married. Employed by the U. S. Steel Corp. for more than 12 years. Experienced on designing, estimating and erecting machinery and buildings. Have held various responsible positions, including that of master mechanic and works engineer. At present employed as supervisor in the munitions industry. Excellent references if desired. Minimum salary $3600. B-174.

MECHANICAL ENGINEER, thoroughly experienced in conception, designing, manufacturing and factory management. Has had extensive practice and contact with men. Free to take position after February 1. B-175.

PRODUCTION ENGINEER OR SUPERINTENDENT, technical graduate, desires connection with concern requiring man to organize plant on modern lines. Eleven years' experience in large plants, covering wide range of manufacturing. In charge of rate-setting schedules, production, costs; familiar with modern shop-accounting systems. Worked under direction of leading consulting industrial engineers. At present Captain in Ordnance Department. Available on or before March 1, 1919. Salary $3600. Prefer location in New York City, Philadelphia or Boston. B-176.

PRODUCTION ENGINEER, technical graduate, single, age 30, desires position with good opportunities. Recently discharged from army. Has had 4½ years' experience in machine-tool production, steel working and general plant engineering; 1½ years' as assistant to superintendent in ammunition manufacturing plant. Location immaterial. B-177.

MECHANICAL ENGINEER, technical graduate, desires responsible position in well-organized industrial engineering firm, or any executive position in a live manufacturing concern. Well versed in up-to-date manufacturing and industrial-engineering methods. B-178.

EXECUTIVE ENGINEER, electrical and mechanical, age 35, married, college graduate, associate, A.I.E.E., available April 1 or sooner for position requiring initiative, engineering and executive ability. Thoroughly experienced in power-plant operation, electric generation, transmission and conversion; industrial lighting and motor applications. For several years in executive charge of two-million dollar composite power proposition, including electric generation, compressed air, hydraulic pumping, ice manufacture, heating, ventilation and elevator operation. At present engaged in safety and welfare engineering, technical writing, special surveys of various manufacturing processes and missions requiring tact and diplomacy. Salary $5000. Prefer Eastern location. B-179.

GAGE DESIGNER, age 28, married, two years' experience on gage analysis and design; 2 years as chief inspector on fuse parts; 2 years on automatic machine design; several years on miscellaneous drafting; organizing ability. Minimum salary $200 per month. B-180.

PRODUCTION SUPERINTENDENT OR SHOP SUPERINTENDENT, for small or medium-sized growing concern. Graduate mechanical engineer, experience mechanic and designer. Available February 1. Salary $3000. Prefer location Ohio. B-181.

SALES ENGINEER, age 35, American, graduate mechanical engineer, 13 years' experience in designing, construction, manufacturing, industrial valuations and selling to metal-manufacturing industries. Have initiative and ability to get results, keen, aggressive and of pleasing personality. Five years in present position as sales engineer for large manufacturer. B-182.

DRAFTSMAN, graduate M.E., 1916, age 25, two years' experience in the design, layout and erection of refrigerating and chemical plants and machinery. Recently discharged from Chemical Warfare Service. Prefer location in East. B-183.

DRAFTSMAN, graduate M.E., 1913, desires position with commercial establishment in New York City. Experienced on boiler, marine and stationary power plants. B-184.

INDUSTRIAL ENGINEER, age 22, American, pleasing personality, graduate Pennsylvania State College, 1918. About 1½ years' experience along mechanical lines and scientific management. Gave up position to enlist in heavy artillery, commissioned, and recently discharged. Available immediately. Salary comparatively unimportant if connection can be made with right concern. B-185.

MECHANICAL ENGINEER, age 28, with business and efficiency training for executive work, eight years' experience in design and manufacture of heavy machinery, production man, one year in chemical machinery design and plant layout, construction superintendent. Last 5 years in responsible charge. Minimum salary $200 per month. B-186.

CHIEF ENGINEER OR SUPERINTENDENT OF POWER; American, married, good habits, technical graduate, desires position with future possibilities; 10 years' successful, practical experience. Good executive and expert workman. Experienced in design, construction, operation and maintenance of railway, lighting, power and heating of factories and public utility plants. Location immaterial. Moderate salary. B-187.

ENGINEERING EXECUTIVE, age 30, married, available as assistant to president or general manager. Mechanical engineering and business administration training. Experienced in inspection, operation, production, employment welfare and purchasing. Prefer location offering good home and school advantages. Salary $3000. B-188.

POWER-PLANT ENGINEER; technical graduate in steam and electrical engineering, age 25, married. At present in war work, 8 years' experience in erecting, testing, operating, and maintenance of power-plant equipment; shop work. Possess executive ability. Desires position in power house. Available on 15 days' notice. B-189.

CHIEF ENGINEER OR PRODUCTION SUPERINTENDENT; age 35, with mature training and extensive experience. Two years' executive experience in production work, is now on engineering staff of one of the builders of precision machine tools of highest quality. Minimum salary $6000. B-190.

Please mention MECHANICAL ENGINEERING, known as the Journal of The American Society of Mechanical Engineers, in your reply.

INDUSTRIAL EXECUTIVE; technical, mechanical and electrical engineer. Age 36, married, ten years' experience in plant organization, production and efficiency work; also in capacity of manager in power plants, machinery manufacturing plants, ice plant, paper mill and candy factory; valuation and appraisal work. Available March 15 or before. Salary $6000 for permanent position. B-191.

MECHANICAL AND ELECTRICAL ENGINEER, age 36, married. Technical graduate. Ten years' experience power-house design, operation and construction; appraisal work; also production and manager in manufacturing plant. Available at once, now completing contract with company on power-plant reports and economies for thirty plants. Salary $6000. B-192.

VALUATION ENGINEER, available on short notice for responsible temporary or permanent position. Experience in public utilities and industrial properties. B-193.

INDUSTRIAL ENGINEER; at present engaged as production engineer, congested ordnance district, wishes to connect with similar duties. Experienced in control of plant maintenance and production methods. B-194.

ENGINEER, EQUIPMENT, 25 years' experience, desires to connect with firm needing man familiar with designing of equipment for manufacture of small parts, such as typewriters, computing machines, firearms on the interchangeable plan. Capable of taking charge of drafting department. Prefer location in central New York State. B-195.

Please mention MECHANICAL ENGINEERING, known as the Journal of The American Society of Mechanical Engineers, in your reply.

MECHANICAL ENGINEER, American, 29 years of age, married, graduate of Columbia University, desires position offering opportunity for expansion along lines of marine engineering and steam or oil engine design. Thoroughly experienced in machine-shop methods and erecting, drafting room in all phases, checking and calculating. Interested in position along above lines as chief draftsman, or engineer, with ship or engine building concern, or with consulting engineer desiring an engineer with resourcefulness, tact, office, shop and shipyard experience, accurate and quick to get results. Present salary $300 per month. B-196.

CHIEF DRAFTSMAN. Designing engineer, competent executive, with technical training and broad practical experience in design of machines, tools, fixtures and jigs. Thoroughly familiar with modern methods used in duplicate production. B-197.

MANAGER, SUPERINTENDENT: Officer in U. S. Army, Ordnance Department, technical graduate, desires position after release; 10 years' experience in manufacture of fire arms and equipment for same. Last two years have had supervision of manufacture of several types and makes of machine guns. Successful in handling help. B-198.

MECHANICAL ENGINEER, age 25, married. Head of chemical laboratory and by-product foreman in gas plant. Marine engineer, with experience on piping and equipment. B-199.

MECHANICAL ENGINEER; graduate 1918. Honorable discharge from Army. Experienced on gasoline motors. Prefer New York City or vicinity. B-200.

ENGINEER, college education, with 30 years' experience on heavy hydraulic-press work and other heavy metal-forging machinery, is open to position as chief or in a consulting capacity. Has designed some of the largest hydraulic forging plants in this country. B-201.

INDUSTRIAL ENGINEER, age 34, desires position as chief engineer, superintendent or manager. Eleven years' experience on quantity production of small, accurate, mechanical and electrical apparatus or tools. Experienced engineer or executive. Prefer location near New York City. Salary $3600 to $4000. B-202.

MECHANICAL ENGINEER, age 29, single. Experienced in maintenance and upkeep of industrial plant, including generating and refrigerating machinery, air compressors, heavy hydraulic pumps and presses, centrifugals and acid apparatus. Prefer location in Middle West or East. B-203.

MECHANICAL ENGINEER, with 25 years' broad experience in U. S. A., Europe, India and Venezuela, on mining, manufacturing, construction, maintenance, power construction and operation, desires to connect with firm needing works engineer where all-around experience is essential and permanent position is assured. Available March 1. Salary $3500. Location Eastern States. B-204.

MANAGER, OR PRODUCTION ENGINEER; American, 26 years' practical experience, covering steam and internal-combustion engines, standard, marine and tractor types, locomotives, electric motors and generators, mining machinery, gas producers, steam and power pressure, vacuum pumps, patent models, special machine tools, milking machines, separators, munitions, factory building, plant layout, routing, tool and jig design for rapid

accurate production with unskilled labor a specialty. B-205.

MEMBER: Major in Ordnance Department, U. S. A., recently discharged, desires position in industrial management lines. Several years' experience as factory manager. B-206.

ARMY OFFICER, 4 years' civil and 6 years' mechanical and electrical engineering experience, including industrial-plant construction, power-plant construction and operation, superintendent A. C. generating and distributing stations and experimental engineering, derivations of gases, etc. Strong in executive capacity requiring broad engineering experience. B-207.

PRODUCTION EXECUTIVE. Age 36, married, with 20 years' practical experience as machinist, toolmaker and general foreman. In the production of interchangeable tools and machine parts, on automatic, semi-automatic and single purpose machines. Active, energetic and ambitious. Good technical education. Ability to handle all kinds of help. Desires position with up-to-date concern. Complete record on request. B-208.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER FEBRUARY 18

BELOW is a list of candidates who have filed applications since the date of the last issue of THE JOURNAL. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 155.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by February 18, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

Alabama

ADAMSON, WALTER LEE, Assistant to Martin J. Lide, Consulting Engineer, Birmingham
BIELEK, ARTHUR, 2nd Lieutenant, 36th Field Artillery, Camp McClellan

California

KLITGAARD, CARL E., Chief Inspector Construction and Repair, U. S. Shipping Board, Division of Operation, San Francisco
SIBBETT, GEORGE E., Mechanical Engineer, Columbia Steel Company, San Francisco
TODD, LAFE, Chief Engineer, Union Oil Co., San Luis Obispo
VAIL, DAVID P., with Chas. C. Moore & Company, San Francisco

Colorado

OLDHAM, EDWARD L., Chief Draftsman, The Denver Rock Drill Manufacturing Company, Denver

Connecticut

BARNES, FULLER, General Manager & Treasurer, The Wallace Barnes Company, Bristol
BRONIE, WILLIAM, Assistant Superintendent, Colt's Patent Fire Arms Manufacturing Company, Meriden
CARLSON, CARL R., Service Engineering, S. K. F. Ball Bearing Company, Hartford
CLARK, ADELBERT B., Supervisor of Gage Repairs, Colt's Patent Fire Arms Manufacturing Company, Meriden
CLARK, JAMES M., 3RD, Manufacturer, J. M. Clark Company, Bridgeport
COLES, CHARLES H., Superintendent, Vicker Machine Gun Division, Colt's Armory, Hartford
GRIPPIN, WILLIAM J., Treasurer, The Bilton Machine Tool Company, Bridgeport
LEAHY, PATRICK J., Foreman Machine Repair Department, The Bullard Engineering Works, Inc., Bridgeport
NORRIS, ALFRED G., Sales Engineer, S. K. F. Ball Bearing Company, Hartford
THORPE, ALBERT E., General Foreman, Winchester Repeating Arms Company, New Haven
WHITE, CLIFFORD M., Gun Process Engineer, Winchester Repeating Arms Company, New Haven

Delaware

KIDD, WALTER S., Division Engineer, E. I. du Pont de Nemours & Company, Wilmington
PARIS, PERCY G., Superintendent, Bethlehem Loading Company, New Castle

District of Columbia

BARTLETT, THOMAS E., Chief Draftsman, Trench Warfare Section, Engineering Division, Ordnance Department, U. S. A., Washington
BARTON, H. ELLIOTT R., Captain, Ordnance Department, U. S. A., Engineering Division Artillery Ammunition Section, Washington
FAXON, FRANCIS E., Supervising Inspector of Ordnance Material, Ordnance Department, Inspection Division, Washington
GASTROCK, ALBERT E., Captain, Ordnance Department, U. S. A., Washington
GOTTSMAN, VICTOR, 1st Lieutenant, Ordnance U. S. A., in charge Production of certain Artillery Carriages, Washington
LYNCH, JOHN J., Assistant Examiner, U. S. Patent Office, Washington
MCGOWAN, FRANK R., Textile Technologist, Bureau of Standards, Washington
VRABEC, GUSTAV L., Machine Tool Designer, Ordnance Department, Washington

Illinois

ADAMSON, FREDERICK G., Treasurer, Stephens-Adamson Manufacturing Company, Aurora
BENSON, CHENERY F., Engineer, Foreman, Bureau of Standards, Washington
CORFF, EDWARD V., Checker, American Car & Foundry, Chicago
DEBOOS, FRANK A., Engineering Department, Underfeed Stoker Company, Chicago
ESTES, LORING V., President, L. V. Estes, Incorporated, Chicago
HIGH, RALPH B., Superintendent, Wood River Refinery, Roxana Petroleum Company of Oklahoma, Wood River
HOLMES, WILLIAM M., Assistant Inspector of Engineering Materials, Bureau of Steam Engineering, U. S. Navy, Chicago
SEELIG, LESTER, Mechanical Draftsman, Armour & Company, U. S. Yards, Chicago

Indiana

BAKER, HUGH J., President, Hugh J. Baker & Company, Indianapolis
CARETTA, ETTORE, Chief Engineer, Pomilio Brothers Company, Indianapolis
LA MANNA, THOMAS G., Chief Draftsman, Pomilio Brothers Corporation, Aviation Experimental Works, Indianapolis

Kansas

BALDWIN, LESLIE A., Superintendent Stationary Boilers, Empire Gas & Fuel Company, Eldorado
LEWIS, CLARENCE W., Superintendent Steam Power Department, Empire Gas & Fuel Company, Eldorado

Maryland

ELSBY, ALDEN G., Captain, Chemical Warfare Service, Edgewood Arsenal, Baltimore
GREENLAND, SAMUEL W., Major, Chemical Warfare Service, U. S. A., Edgewood Arsenal, Edgewood
KING, DEWITT L., Ensign, U. S. N. R. F., U. S. Naval Academy, Annapolis
MEHRHOF, FLOYD E., 1st Lieutenant, Ordnance Department, U. S. A., Aberdeen Proving Grounds, Aberdeen
PFAFF, GEORGE C., Assistant Chief Draftsman, Bartlett Hayward Company, Baltimore
SNYDER, FERDINAND L., Assistant Engineer, Baltimore Copper Smelting & Rolling Company, Baltimore
TEMPLETON, NORMAN M., 1st Lieutenant, Chemical Warfare Service, U. S. A., Edgewood Arsenal, Edgewood
WALSH, MAURICE L., Structural & Mechanical Draftsman & Designer, Bethlehem Shipbuilding Corporation, Ltd., Sparrow's Point

Massachusetts

ANDERSON, ARTHUR, Mechanical Engineer, Henrici Laundry Machinery Company, Boston
CAMPBELL, LESTER, Designing & Experimental Engineer, Head of Experimental Department, Foster Machine Company, Westfield
CLEVELAND, BYRON R., J. H. Horne & Sons Company, Lawrence
DERR, THOMAS S., Private, 1st Class, Chemical Warfare Service, Brookline
FERGUSON, THOMAS W., Assistant Superintendent, Deane Works, Worthington Pump & Machine Corporation, Holyoke
GLOSSA, ALOYSIUS J., Production Engineer, Station Engineering Department, The Edison Electric Illuminating Company of Boston, Boston
HOLMES, V. FRANK, President & Treasurer, Power Equipment Company, Boston
LOWELL, HENRY O., Junior Engineer, Cooley & Marvin Company, Boston
LUSTER, EDMOND C., Service Manager, Otis Elevator Company, Boston
MADDOCKS, JOHN H., Safety Engineer & Machine Designer, Forbes Lithograph Manufacturing Company, Chelsea
MAGOUN, FREDERICK A., Engineer, Westinghouse Electric & Manufacturing Company, Boston
STEERE, THOMAS W., Draftsman, Engineer, U. S. Cartridge Company, Lowell
SUTTON, HARRY M., Supervising Engineer, Cooley & Marvin Company, Boston
VAN NORMAN, FREDERICK D., Vice President, Van Norman Machine Tool Company, Springfield
WHEELER, LEVI E., Planning Department, Route Clerk, Osgood-Bradley Car Company, Worcester
WILLIAMS, EDWARD H., Inspector, Associated Factory Mutual Insurance Companies, Boston
WRIGHT, CLAUDE W., Superintendent, Taunton-New Bedford Copper Company, New Bedford

Michigan

HOWELL, CLARENCE W., Captain Q. M. C., U. S. A., Assistant Constructing Quartermaster, Camp Custer
MEYER, WENDEL J., Assistant Hull Inspector, United States Shipping Board, Emergency Fleet Corporation, Wyandotte
WEST, WILLIAM F., General Superintendent, Keller Pneumatic Tool Company, Grand Haven

Minnesota

RIGGINS, SAMUEL P., Captain Ordnance Department, U. S. A., Minneapolis Steel & Machinery Company, Minneapolis

Missouri

BUBB, FRANK W., Improvement Engineer, American Car & Foundry Company, St. Louis
CALLAWAY, JAMES H., Sales Manager, Kansas City office of DeLa Vergne Machine Company, Kansas City
HOERMANN, ALFRED E., New York Manager, Curtis Pneumatic Machinery Company, St. Louis
SIEGERIST, WALTER, Instructor, Washington University, St. Louis

New Hampshire

VOSE, ALFRED H., Assistant Chief Draftsman, Amoskeag Manufacturing Company, Manchester

New Jersey

BROWN, JACOB H., Designer & Checker in Stationery Drafting Department, Babcock & Wilcox Company, Bayonne

BROWN, JAMES S., Superintendent of Equipment, International Arms & Fuze Company, Bloomfield

JONES, DAVID R., Assistant Hoist Engineering Department, Sprague Electric Works of General Electric Company, Bloomfield

KEARNEY, FRANK V., Checking Boiler Designs and Calculations, Babcock & Wilcox, Bayonne

KOOPMAN, THOMAS O., Chief Electrician, Submarine Boat Corporation, Newark

MARSTON, CUSTIS A., General Superintendent, Bijur Motor Appliance Company, Hoboken

MILLS, PERCY E., Supervisor of Shop Clerks and Department, Wright-Martin Aircraft Corporation, New Brunswick

MULVEY, TERRENCE J., Department Manager, International Arms & Fuze Company, Bloomfield

PAYNE, RICHARD M., Submarine Boat Corporation, Port Newark

SIEGLER, GEORGE E. M., Sergeant 1st Class, Approvals Department, Bureau Aircraft Production, Standard Aircraft Corporation, Elizabeth

New York

BARNARD, DANA W., Manager, Credit Department, Semet-Solvay Company, Syracuse

BERGMANN, WILLIAM D., Mechanical Draftsman, Brooklyn

CARLSON, JOHN R., Secretary and New England Manager, Walter N. Polakov & Company, Incorporated, New York

CHERIEZ, CHARLES E., Civil Engineer, New York

CONSLER, ROBERT E., Employment Manager, Art in Buttons, Incorporated, Rochester

DE LUKACSEVICS, CHARLES M., Consulting & Contracting Mechanical Engineer, New York

DE MILAN ALEXANDER, in charge of Engineering Department, William J. Farrell, New York

EWART, WILLIAM M., Local Engineer, American Car & Foundry Company, Depew

HAY, WILLIAM O., JR., Lieutenant, U. S. N. R. F., Electrical Officer, U. S. S. Kearsarge, New York

HAZEN, EDWIN R., Ensign, Leading Instructor U. S. Navy, Gas Engine School, Columbia University, New York

HILL, C. A., Brooklyn

HOLDEN, JOSEPH B., Assistant Superintendent of Engineering, Remington Typewriter Company, Syracuse

JOHNSON, ERNST M., Telephone Engineer, Western Electric Company, Incorporated, New York

KAPTEYN, ALBERT, JR., Assistant Manager, New York Export Office, Cleveland Tractor Company, New York

LAROCCA, JOHN A., Mechanical Designer, Ford, Bacon & Davis, New York

MORRISON, ARCHIBALD B., JR., Manager Power Plant Department, Hercules Engineering Corporation, New York

POWEL, CHARLES A., Assistant Inspection Officer, British War Mission, New York

POWERS, WHITNEY S., Installer, Miller Franklin Basset & Company, New York

PRIGOFF, HAROLD, Plant Layout and Machine Erection Engineer, Savage Arms Corporation, Utica

SNYDER, RUSSELL C., Factory Systematizing, Pace & Pace, New York

SUTERS, THOMAS, Plant Engineer, Library Bureau, Ilion

WALKER, GEORGE E., Ordnance Department Instructor, Chemical Engineering School of Explosives, Columbia University, New York

Ohio

ALLEN, CLIFFORD G., Chief Draftsman, The Simplex Machine Tool Company, Cleveland

Armitage, JOSEPH B., Mechanical Engineer, Aluminum Castings Company, Cleveland

BIEHL, JOHN F., Engineering Department, American Tool Works Company, Cincinnati

CLAPPER, RAY L., Test Engineer, Griscom Russel Company, Massillon

ELWELL, FRANK D., Assistant Maintenance Engineer, Dayton Engineering Laboratory Company, Dayton

GRAHAM, OLIVER B., Ordnance Designer, T. H. Eickhoff, Cleveland

KAMMERER, WILLIAM C., Assistant to Works Engineer, National Carbon Company, Incorporated, Cleveland

REDDY, BYRON H., Chief Engineer, National Pressed Steel Company, Massillon

Oregon

ARMSTRONG, EDWARD P., President & Manager, Armstrong Manufacturing Company, Portland

MCGONIGLE, CHARLES, President, Western Structural Steel & Tank Company, Portland

Pennsylvania

ANGOVE, JOSEPH A., Assistant General Superintendent, National Transit Pump & Machine Company, Oil City

BIRIGHANS, ALEXANDER J., Electrical Engineer, Lehigh Plant, Bethlehem Steel Company, South Bethlehem

CARROLL, WILLIAM P., Field Representative & Consultant, Emergency Fleet Corporation, U. S. Shipping Board, Philadelphia

FARWELL, FRANCIS, Bethlehem Steel Company, Bethlehem

GLEDHILL, HERBERT W., District Manager, Shepard Electric Crane & Hoist Company, Philadelphia

HAUGHTON, SEYMOUR P., Mechanical Engineer, Philadelphia District Office, Ordnance Department U. S. A., Philadelphia

JAMES, MARK S., Engineer, Mesta Machine Company, Pittsburgh

LAMBORN, J. PAUL, Mechanical Engineer, Wm. Cramp & Sons Ship & Engine Building Company, Philadelphia

MOORE, FRANK E., Treasurer & General Manager, Mathews Gravity Carrier Company, Ellwood City

OECHSLE, THEODORE F., Plant Engineer, David Lupton's Sons Company, Philadelphia

OLSON, OSCAR R., Mechanical Draftsman, Westinghouse Machine Company, East Pittsburgh

PECKER, JOSEPH S., Checker, Frankford Arsenal, Frankford

POOS, JOHN P., Master Mechanic, West Leechburg Steel Company, Leechburg

SAUTER, WILLIAM V., Vice President, American Engineering Company, Philadelphia

SLOAN, THEODORE H., Lieutenant, Superintendent of the Pittsburgh Station of the Bureau of Service & Research, Carnegie Institute of Technology, Pittsburgh

SMITH, WILLIAM C., Master Machinist, Small Arms Ammunition Department, Frankford Arsenal, Philadelphia

STROTT, WILLIAM C., Machine Designer, Blaw-Knox Company, Hoboken

WELLS, RUSSELL D., Captain Ordnance Department, U. S. A., Inspection Division, The Floyd-Wells Company, Royersford

South Carolina

NOXON, JAMES A., 1st Lieutenant, Construction Division, Quartermaster Corps, U. S. A., Columbia

Tennessee

ALLBEE, WILLIAM G., Civil Engineer, du Pont Engineering Company, Nashville

MASSEY, WILLIAM J., Chief Power Superior, DuPont Engineering Company, Jacksonville

Canada

FARWELL, JOHN B., Works Manager, Canadian Standard Products, St. Catherines, Ontario

SNIDER, ARTHUR M., Production Engineer, Canadian Ingersoll-Rand Company, Ltd., Sherbrooke

France

MOONEY, JAMES D., Captain, 309 Ammunition Train, 84th Division, A. E. F.

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE MEMBER

Connecticut

LINCOLN, FRANK S., Mechanical Engineer, Bullard Machine Tool Company, Bridgeport

Illinois

AIREY, JOHN, Master Mechanic, R. & V. Wagner Ordnance Company, East Moline

Massachusetts

COVE, JAMES R., Plant Engineer, Lever Brothers Company, Cambridge

Missouri

ECKERT, ARTHUR C., Patent Attorney, St. Louis

Canada

TAYLOR, ALFRED J. T., Managing Director, The Taylor Engineering Company, Ltd., Vancouver, B. C.

PROMOTION FROM JUNIOR

Illinois

PENNEY, RUPERT L., Superintendent of Armory Shops, Rock Island Arsenal, Rock Island

Maryland

CONN, THOMAS D., Member Engineering Department, Bethlehem Shipbuilding Corporation, Ltd., Sparrows Point

New Jersey

STEGMANN, GEORGE H., Machine Designer, Remington Arms U. M. C. Company (Reinstatement), Hoboken

New York

DARLOW, ALFRED M., General Manager, Buffalo & Susquehanna R. R. for U. S. R. R. Administration, Wellsville

HARRISON, HARRY, Refrigerating Engineer & New York Sales Manager, The Brunswick Refrigerating Company, New York

KUNZ, WILLIAM J., Mechanical Engineer, The Air Reduction Company, Inc., New York

LYON, PERCY S., Captain, Coast Artillery, Brooklyn

Ohio

OSTER, EUGENE A., Mechanical Director, The Ault & Wiberg Company, Cincinnati

Pennsylvania

PORTER, CHARLES T., Aeronautical Mechanical Engineer, Naval Aircraft Factory, Philadelphia

SUMMARY

New Applications	141
Applications for change of Grading:	
Promotions from Associate Member	5
Promotions from Junior	9
Total	155

SUMMARY SHOWING AVERAGE AGE AND POSITIONS OF APPLICANTS ON BALLOT DECEMBER 23, 1918

Average age of applicants:	
Members	42
Associates	41
Associate-Member	33
Juniors	25
Administrative Engineer	1
Calculator	1
Chief Engineers	13
Consulting Engineers	5
Construction Engineers	3
Contracting Engineer	1
Designers	7
District Engineers	2
Draftsman	5
Chief Draftsman	4
Directors	1
Engineer of Tests	3
Erecting Engineer	2
Executives (Pres., Vice Pres., Sec'y., Treas., Mgrs.)	19
Foreman	1
Field Engineer	1
Inspectors	2
Instructor	1
Lubricating Oil Engineer	1
Master Mechanic	2
Mechanical Engineer	19
Asst. Mechanical Engineer	1
Plant Engineer	2
Power Engineer	2
Asst. Production Engineer	1
Resident Engineer	1
Sales Engineer	2
Sales Manager	3
Service Engineer	1
Superintendents	8
Asst. Superintendents	3
Supervisor	1
Miscellaneous	24

UNITED STATES GOVERNMENT SERVICE

Captain	4
1st Lieut	9
2nd Lieut	2
Ensign	1

LOOK OVER

the current number of MECHANICAL ENGINEERING, The Journal of our Society; then write Calvin W. Rice, Secretary, 29 West 39th Street, New York, telling him what you like about the number, what you do not like, and what your suggestions are for improvement. Talk over our Journal with other members and get their opinions also; and not only send your suggestions and theirs but keep the Secretary informed about important developments that come to your attention and upon which you would like to see contributions.

The Publication and Papers Committee desires the coöperation and assistance of every member of the Society in the production of MECHANICAL ENGINEERING. This Journal can be made just as valuable to the membership and to engineers generally as the membership themselves will make it; but no more valuable. It is distinctly up to the membership to make good if their publication is to make good.

Already the 26 Local Sections Committees are regularly contributing timely material in the form of papers presented at meetings in their respective cities. The Meetings and Program Committee contributes the valuable papers of the Annual and Spring Meetings. The other standing committees and professional committees are also regularly contributing.

Every one of these committees is a part of the editorial staff of MECHANICAL ENGINEERING, searching the country from North to South and East to West for information upon the latest engineering developments. Because of their distribution throughout the country they are able to keep in touch with these developments and to report them through the pages of MECHANICAL ENGINEERING for the benefit of members everywhere.

At Society headquarters a staff of trained experts is regularly reviewing the periodical literature of the world, summarizing the leading articles for The Engineering Index and abstracting the most important of these for the Engineering Survey section. They are producing a "Review of Reviews" of the engineering field which no engineer who desires to keep in touch with professional work throughout the world can afford to miss.

All that is now needed to produce a professional engineering monthly such as the Publication Committee feels sure every member would like to have as the representative publication of his Society, is for every member to consider himself also an active member of the publication staff and to give the Society the benefit of his suggestions, just as the many committees of the Society are now doing.

In two sections—Section Two

MECHANICAL ENGINEERING

THE JOURNAL OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

Volume 41 March, 1919 Number 3

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications and positions listed below combine the services of the Society, and of the Engineering Societies Employment Bureau, Room 903, Engineering Societies Building.

POSITIONS AVAILABLE

Stamps should be inclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society records.

MAN WITH MECHANICAL ENGINEERING TRAINING or experience, who has some first-hand knowledge of industrial haulage problems, and sales experience, who would be interested in doing sales or sales-promotion work in connection with industrial tractors, trailers, cars and locomotives in the Philadelphia territory. C-020.

SALES ENGINEER to be located in Chicago, to promote the sale of mechanical equipment such as rollers, asphalt plants, etc. Man who has had some mechanical education or training in early life, with sales experience. Give name and experience to enable firm to judge of qualifications, before entering into active negotiations. C-024.

MECHANICAL ENGINEER, as manager for large concern in Cuba, manufacturing sugar machinery and doing marine repair and general construction work. Applicant must have experience in administrative work and know Spanish. Reply, giving references, experience and salary expected. C-047.

MECHANICAL OR CHEMICAL ENGINEER for the design of large gas furnaces for high-temperature work. Man with 2 or 3 years practical experience desired. Thorough knowledge of technical thermodynamics very essential. Progressive concern, Central New York. C-025.

YOUNG TECHNICAL GRADUATE, Cornell man preferred, to work up designs of water-tube boiler to put on market. Sufficiently well equipped to design the boilers with aid of superintendent, and able to make such tests as would be necessary to produce the best results. Would be expected to devote his time entirely to the water-tube boiler, and perhaps handle the shop correspondence on subject. Salary $250 a month. Location, Galesburg, Illinois. C-026.

REFRIGERATING SALES ENGINEER to take charge of Eastern office of established concern of ice-machine manufacturers. Must be acquainted in engineering field of New York and surrounding territory. Splendid opportunity for right man. C-027.

GRADUATE ENGINEER from a well-known college or university, with practical experience in modern factory production. Must have held responsible executive positions, of unquestioned energy and ability, and be a student of and believer in modern methods of management. Age 33 to 37 years. Must be able to lead and direct the activities of 700 or 800 people. Position to be filled at once. In letter, state fully, age, education, details of experience, when able to report, salary desired. Location, Middle West. C-028.

TECHNICAL MAN in the operation of ice-making and refrigerating plants, of both absorption and compression systems, especially covering economical operation, boiler and engine testing, efficiency determinations, etc. Highest qualifications and broad knowledge of such work essential. Must have practical experience along such lines. Reply giving salary expected at start, and full details of experience and references. Good opportunity for young man of required experience and advancement assured in a permanent position. State when at liberty. Location, Middle West. C-029.

INSTRUCTOR in engineering department of technical school. Mechanical engineer. Location, Massachusetts. C-030.

ENGINEER OR PHYSICIST with aptitude for writing or editorial training wanted to compile and digest information on furnaces, pyrometry and heat treatment. Interest or experience in technical and commercial research and development desirable. State age, previous experience and salary expected and, if possible, send samples of own authorship. C-033.

WORKS MANAGER, to take charge of power house and maintenance of plant; familiar with conveying machinery, railroads and locomotive cranes. Technical graduate with at least 5 years experience in mechanical lines and plant maintenance. Salary $200 to $250 per month at start. C-034.

CHIEF DRAFTSMAN familiar with designing sugar and chemical machinery, capable of supervising 20 draftsmen. State age, experience and salary desired. C-035.

TECHNICAL GRADUATE for engineering department, live energetic man, who has had some practical experience in designing, and if possible, experience in pumping equipment and air compressors. Location, Michigan. C-036.

SALES OPENING for a bright young energetic hustler, who has had an engineering education and training with two or three years' experience in business preferred. Young man with the necessary qualifications and some experience in the steel business would likely be particularly interested in the opportunity. Applicant requested to communicate with Mr. H. H. Davis, Asst. General Sales Agent, and advise education, experience, former business connections and other interesting information. C-040.

ENGINEER to take charge of engine and boiler house of an industrial plant in Middle Western city as chief engineer. Must be experienced, thoroughly capable of handling modern steam turbines generating station of 6,000 kva. capacity and boiler plant of 5,000 rated hp., thorough working knowledge of modern boiler efficiency instruments and methods, and first-class mechanic and capable of handling men. Replies should give complete education and experience of applicant, together with age, reference, salary expected, etc. C-041.

DRAFTSMAN for Maintenance and Construction Department in charge of buildings and machinery in large steel and wire mill, in Western Massachusetts. Give full information when writing and state salary expected. C-042.

MECHANICAL ENGINEER who has had experience in selling, and also some experience in designing heavy machinery, to take charge of export sales department. C-043.

CHECKER AND SQUAD BOSS wanted by a large manufacturing plant located in Eastern Pennsylvania. Must have experience along mechanical lines, preferably power plant, coal, ash and ore handling systems, as well as knowledge of structural steel. State age, nationality, references and salary expected in first letter. C-044.

EXPERIENCED CONSTRUCTION ENGINEER. Man not over 35 years of age, with several years' experience in building construction. American. Technical college graduate. Single. Single. Good salary with opportunities for advancement with large corporation. C-045.

SEVERAL POSITIONS for young civil and mechanical graduate engineers. Not over 26 years of age. Single. American. Previous experience not essential. All for service in the Far East. C-046.

SALES ENGINEER possessing working knowledge of Spanish and having mechanical engineering experience, though not necessarily a technical graduate, to represent concern manufacturing oxy-acetylene apparatus for welding and cutting metals; knowledge of the process desirable. Location, Cuba, Mexico, and South America. Salary depends upon man. R-146.

MASTER MECHANIC and equipment engineer. Experienced man with technical training to take full charge of manufacturing equipment in Eastern concern making small steel parts. Personal interview required. State experience. C-0257.

DRAFTSMAN for contractor's office, thoroughly experienced in conveying systems for boiler houses, ground storage plants, locomotive coaling stations, etc., and familiar with structural steel. Permanent position, good salary and opportunity for advancement to right man. State salary desired and complete experience. Apply by letter. Location, Philadelphia. C-0628.

DESIGNING MECHANICAL ENGINEER; high-grade technical man wanted to take charge of design, thoroughly experienced in design of cranes, coal and ore, handling bridges and towers, coal screening and sizing equipment, shipbuilding and wharf cranes, coal tipple equipments, conveying machinery, etc. State education, nationality, salary desired. Information confidential. Location, Canada. B-0876.

SEVERAL YOUNG MEN in engineering department of manufacturer of recording meters and power-plant equipment; prefer those having technical training in mechanical engineering. Position offers good inducements, experience and future. C-901.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 12th of the month, and the form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

MANAGING OR SALES ENGINEER or factory manager in Eastern location, having lately completed Government war contract, desires permanent position. Over 20 years' experience in practical engineering and with special knowledge of organization, estimating and efficiency methods. Has held executive positions with large manufacturing corporations in East and Middle West. References of the highest class. Minimum salary $5000 per year. C-209.

MILL ENGINEER OR SUPERINTENDENT. Graduate mechanical engineer, age 31, with 10 years' experience in engineering, manufacturing and management problems. Thoroughly familiar with milling, power plants and the handling of material in bulk and package. Can be released from Naval service March 1, 1919. Salary $6000. C-210.

SALES ENGINEER; aged 43, technically educated, married, formerly with manufacturer of air-handling machinery, mechanical draft, steam turbines, engines, economizers and stokers. Vacating position in favor of returning overseas army officer. Fourteen years' selling experience in this territory. Well acquainted in industrial circles and power plants. Would like to remain in New England district. C-211.

DESIGNING ENGINEER, or chief draftsman, now employed, would make a change. Experienced in calculating and tabulating machinery, adding machines, automatic and kindred devices, experiment and tool work. Familiar with up-to-date shop practices. Age 34, salary $3500. C-212.

TECHNICAL GRADUATE, desires position with progressive concern. At present employed as mechanical engineer in charge of production and design of porcelain instruments. Held position as chief draftsman and production engineer. Reliable and industrious. Knowledge of chemistry and safety engineering. Minimum salary $2500. C-213.

ENGINEER-EXECUTIVE, M. I. T. graduate, mechanical engineering. Age 24. Varied experience in mechanical and executive lines. Accustomed to assuming responsibility. At present commissioned officer in Small Arms Division, Ordnance Department, Washington, D. C. Desires opportunity with live manufacturing or industrial concern as assistant manager or superintendent. C-214.

MANUFACTURING ENGINEER. Broad manufacturing and executive experience combined with practical shop knowledge, solicits correspondence with manufacturers desiring assistance in managing, organizing, designing and installing manufacturing processes, planning, scheduling, routing work, stock keeping, inspection, and standardization of processes, instructions, and quality. My method is to improve what you have wherever possible and coöperate with your present organization rather than to abandon your present system. C-215.

GRADUATE UNITED STATES NAVAL ACADEMY, honorable resignation from the U. S. Navy, age 36, married; 6 years' civilian executive engineering experience, followed by enrolment in U. S. Naval Reserve Force. At present stationed in China. Would like to get in touch with firms who are either now operating or who contemplate starting in any part of the Far East. C-216.

MECHANICAL ENGINEER, age 29, with four years' experience in the design of jigs, fixtures and punches and dies, 2 years' experience in developing small intricate machines, and 4 years in the processing of military rifle parts. C-217.

EXECUTIVE ENGINEER just completing work as mechanical superintendent of construction for large Government operation and available for new connection in 30 days. Age 33, married, graduate M.E., wide general experience as salesman, designer, chief engineer in charge of design and construction power plants, manufacturing and chemical plants. Accurate and exact knowledge of marketing, manufacturing and construction. Good organizer and handler of men. Experience in hiring labor and adjustments. Highest grade references. Interested as chief engineer, sales manager or similar responsible position. Salary $5000 to start; good prospects for future. Prefer concern with possibilities in foreign as well as domestic field. C-218.

MECHANICAL-CHEMICAL-SALES ENGINEER. Graduate mechanical engineer, 8 years' experience in chemical-plant layout and apparatus design and operation for by-product coke oven concern; 3 years in power plant, heating and ventilating; 6 years in business and sales. Desires connection with company manufacturing engineering specialties, temperature-controlling devices, etc., or chemical by-products, in technical and sales position or as district office manager. Position must offer opportunities for advancement. Would not object to some design work in connection with sales propositions. Excellent references. Age 32, married. Location New York City or vicinity. C-219.

PLANT MANAGER, high-grade man of broad experience with large organizations. Active and progressive executive with successful record in handling labor. Practical knowledge of up-to-date manufacturing in all its branches. Experience in the manufacture of special machine tools, electrical machinery, motors and parts. Only high-grade connections will be considered. American, age 42. C-220.

MECHANICAL ENGINEER and proven executive will soon be released from Government plant. Present position, supervisor of tool inspection at one of the largest airplane motor plants. Twenty-three years' experience in engineering and production, age 41, married. Desires connection in or near New York City. C-221.

SALES ENGINEER. Technical graduate with 20 years' broad engineering experience in power-plant design and operation; building construction and sales engineering work. Location preferred, New York City or vicinity. C-222.

MANAGER, SUPERINTENDENT OR ENGINEER. Technical graduate, 20 years' experience in the manufacture of machine tools, gasoline engines, and electrical machinery in positions from machinist to manager; also experienced in equipment of buildings and in use of modern methods in plant management and production engineering. At present superintendent. C-223.

ENGINEER-SALESMAN, executive, engineering, and sales training, successful on special machinery, tools, and the heat treatment of steels, gas furnaces. Thirty-four years old, married. Location, Philadelphia. C-224.

MECHANICAL ENGINEER. Age 35, with 13 years' practical experience in design of equipment, plant construction and maintenance, hydraulic equipment, building construction and special training in brass-mill engineering covering the manufacture of brass and copper tubes, rods, sheets, wire and cables. At present chief engineer of plant employing 4000 hands. Familiar with European countries and languages. Salary depending on position. C-225.

EXECUTIVE ENGINEER, 18 years' experience in design, construction and operation of textile plants, technical graduate, married, open to engagement with permanent construction company or high-class manufacturing concern. Salary $7000. Will consider a proposition taking interest in small business. Middle West or New England preferred. C-226.

GRADUATE MECHANICAL ENGINEER, with 3 years' experience in research, efficiency and organization engineering with a highly organized button concern. Discharged army officer. Position desired with an industrial establishment as assistant to works manager or with industrial engineer. C-227.

SHOP EXECUTIVE, army captain will require new position upon discharge at early date. Successful as works manager of large shop. Sales and engineering experience. Served apprenticeship as machinist. Has demonstrated ability in handling both skilled and unskilled workers. Age 39. Health good. C-228.

MANUFACTURING EXECUTIVE, graduate mechanical engineer experienced in modern shop methods and production, recently released from army, desires position as superintendent or assistant. C-229.

EXECUTIVE ENGINEER; machine and tool construction, 15 years' experience on high-grade machine, and gages of all types, where extreme accuracy is required. Married and in excellent health, at present employed, but available on two weeks' notice. C-230.

TECHNICAL MECHANICAL GRADUATE, 1915, desires position as assistant to mechanical engineer, or manager. Three years' practical experience in shop, and lately such executive experience as is required of civilian inspector in Ordnance Department of the U. S. Navy, minimum salary to star $2300. C-231.

MANUFACTURING ENGINEER, technical graduate, First Lieutenant Ordnance Department, U. S. Army, expects discharge March 1. Age 31. Seven years' experience in brass and alloy metal manufacturing business, in charge of manufacturing, estimating department, with one of largest brass companies in the East. Broad experience in sheet-metal work, shell drawing, and general brass manufacturing. Best references furnished. Desires connection with manufacturing concern in executive capacity. C-232.

TECHNICAL GRADUATE of Eastern University, 1914; Lieutenant Air Service. Experience in power-plant and general plant engineering, efficiency, installation, maintenance and design; testing of oils, coal and steel. Familiar with factory accounting and shop methods; sales-engineering work, especially export. Fluent knowledge of French, Spanish and German. Travelled abroad. Desires position either purely technical or sales work in United States or abroad. Available about February 15. C-233.

MECHANICAL ENGINEER, desires position as chief engineer or assistant chief engineer where executive experience in handling men and situations is required. Thorough technical training and broad fundamental engineering experience. C-234.

MECHANICAL ENGINEER OR SUPERINTENDENT, at present employed as process engineer. Experienced in manufacture of interchangeable parts. Making special study of hand and automatic screw machines of all types. Technical graduate; over 8 years' practical experience, and fully acquainted with modern factory methods. Experienced in handling of large force of men. Wishes responsible position with reliable and growing concern in East. Available at once. Married. Salary around $3000. C-235.

PLANT MANAGER, 17 years' successful experience as chief engineer, general superintendent and manager of plants manufacturing medium and heavy machinery. Technical graduate, good organizer, familiar with costs and accounting, experienced in quantity production. Has keen appreciation of necessity of coöperation between manufacturing, commercial and financial branches of business. A competent man for large plant. At present employed and interested only in position requiring experience, skill and hard work. C-236.

MECHANICAL ENGINEER, assistant manager, U. S. Army officer, age 30, technical training, experienced in machine-shop and foundry practice. Designer of special machinery, industrial-plant equipment and maintenance. Developing original devices for manufacturing, has initiative and resourcefulness. Seeks position and permanency. Available March 1. Location, New York City or vicinity. Salary $3000. C-237.

HEAT TREATING. Graduate mechanical engineer with 3 years' of intensified experience in steam, drop-hammer and hydraulic press, and variously fired heating-furnace equipment, together with intimate knowledge of millivolt meter and potentiometer types of pyrometers of superintendence and interpretation of physical tests, metallography, and chemical analysis of carbon or alloy steels and of setting temperature and time requirements for heat treatments to meet physical specifications, desires position along similar lines in large concern. Age 27, active, fair minded, and capable of taking charge of an organization. Location preferred in Middle West. C-238.

STEEL FOUNDRY SUPERINTENDENT OR ASSISTANT SUPERINTENDENT. Mechanical engineer, now employed as general foundry foreman of large up-to-date steel foundry. Would like to enter employ of firm of industrial engineers. Position in lines of present work considered if opportunities for advance-

ment on own merit are good. Technical graduate, married, 28 years of age. C-239.

MECHANICAL ENGINEER. At present engaged as ship and engineer surveyor. Desires position as marine engineer superintendent, maintenance or chief engineer. Age 39, married. Shop apprentice 6 years; technical graduate; 10 years' marine engineering; 4 years' field engineer; 5 years' Belgian and 15 years' British experience. Go anywhere, preferably abroad. Salary $4000. C-240.

EXECUTIVE MECHANICAL ENGINEER, technical graduate, 8 years' experience in charge of design, construction, operation and maintenance of industrial plants and equipment. Past year in charge of construction of most important plant in largest nitrate plant in world, and at present in charge of operations. Able organizer, successful in handling men, and result producer. Desires connection with concern requiring executive capable of handling above lines of work. Past record excellent. Highest references. American, 31 years old, married. Location in New York and New Jersey preferred, but will consider other localities. C-241.

MECHANICAL ENGINEER. Cornell graduate, with 20 years' broad experience designing, constructing, operating, maintaining, inspecting, testing and planning seeks permanent connection with manufacturing concern. Especially qualified for position in cement or chemical plants or engineering office or as investigating engineer. At present on large Government chemical plant construction. Work will be completed about March 1. C-242.

MECHANICAL INDUSTRIAL ENGINEER, practical and technical education, age 28, single, American citizen, now holding responsible position with large corporation, plant arrangement, piping, conveying and general machinery, good organizer and systematizer, desires responsible position. Location, anywhere. Best references. C-243.

MECHANICAL ENGINEER, graduate from Royal Technical High School, Stockholm, Sweden, 1902, as mechanical engineer, age 37, married. Fourteen years' experience in design, operation and erection of power plant and power plant machinery. Specialized on oil and coal-refining plants, also on internal-combustion engines. At present in the construction division of the army holding commission as captain but immediately available, resourceful and dependable. Desires position as works engineer, large plant or with oil refinery. Location immaterial. Minimum salary $3000. C-244.

SUPERINTENDENT OF POWER available about May 1. Seeks position as chief engineer in power plant and master mechanic in factory. Technical graduate. Age 24, married. Eleven years' experience all kinds electrical machinery, steam power station equipment, air compressors, pumps and other hydraulic equipment. First-class combustion engineer, and thoroughly familiar with many types boilers and stokers. Consulting engineer steam power plants. Factory maintenance including machines and electric power, water and steam systems. Industrial application of steam and tannery engineering a specialty. Inventive ability. Good executive. Prefer location in the East. Salary $3500. C-245.

STEAM POWER-PLANT MAN with broad education, command of correct English, and 9 years' experience, principally in connection with testing work and maintenance of efficient operating conditions, desires position of responsibility with good prospects. At present employed as technical assistant to chief engineer in large plant. Minimum salary considered $2400 per annum. Age 36 years. Location immaterial. C-246.

MANAGER OR WORKS MANAGER. Mechanical engineer with 18 years' experience in production, mechanical, and executive positions. At present engaged as works manager of engineering and manufacturing concern, supervising the production, costs, designing, and drafting departments, can undertake layout, purchase and installation of entire manufacturing plants. Wishes to get with large manufacturing concern that is willing to pay for results. Salary about $4000 to start; 32 years of age, would expect position abroad. Married. C-247.

METALLURGIST AND CHEMIST, 4½ years in improvement of metallurgical products; 15 months First Lieutenant, Ordnance Department, inspection division; thoroughly acquainted with theory and practice of ferrous and non-ferrous metallurgical analysis, pyrometry, metallography and heat-treatment; competent to design, construct and operate laboratory and heat-treatment plant. C-248.

PLANT AND PRODUCTION ENGINEER with successful record covering 4 years in rubber, textile and paper industries, and 3 years as chief designer and production engineer on munitions with organizations of one to four thousand men. Age 30, technical graduate. Any location. Present salary $3,000. C-249.

ENGINEER, mechanical and marine; technical graduate; G. E. Test, license as chief engineer of ocean steamers. At present chief engineer electric-driven vessel. Married. Desires position as works or maintenance engineer. C-250.

MECHANICAL ENGINEER, army officer, age 32. Four years' civil, 6 years' mechanical and electrical experience, including industrial plant construction, involving steel, concrete, dock-building pipe work, machine-shop work, boiler plant and engine testing and installation and etc. Superintendent A. C. generating station supplying town light and power. Derivation of gases and experimental engineering. Desires to specialize. Strong in executive capacity requiring broad engineering experience. C-251.

CHIEF DRAFTSMAN, SUPERINTENDENT. Designing engineer, age 37, married, graduate mechanical and electrical engineer with extensive practical experience in design and manufacture of automatic and special machines, power presses, tools, jigs and fixtures. Last 9 months on interchangeable parts for trucks and airplanes, thoroughly familiar with modern methods of quantity production. Energetic and reliable character. C-252.

SUPERINTENDENT, technical graduate, age 36, strong disciplinarian, successful handler of men, well up on efficiency, rate setting, cost accounting, and modern shop management; 6 years' engineering and 7 years' plant executive experience. At present employed but desires change along lines of foundry or machine-shop practice. Consideration given only to strong, progressive company whose ideas coincide with those of modern plant management. C-253.

ENGINEERING EXECUTIVE. University training supplemented by extensive experience in power-plant design and construction in East, Middle West and Canada, as designing engineer, construction superintendent and consulting engineer. Three years as chief executive in large electric public utility, and as manager of central station heating plant. Now in responsible executive position, but desires permanent connection where advancement is limited only by ability. Good personality, resourceful and dependable. Married, excellent health. Highest references. Salary $6,000. Prefer location in East. C-254.

TECHNICAL ENGINEERING EXPERT fortified with 10 years' of best of practical experience, as construction and sales engineer; understands design of machinery and the engineering of machinery installation; excellent technical and executive ability substantiated with best of credentials. In a position to enter foreign service. During present emergency connected with Navy Department. Available at once. C-255.

MECHANICAL ENGINEER. Has held positions as toolmaker foreman, chief draftsman, and factory superintendent. At present employed as equipment engineer on ordnance work. Age 33, married. Fourteen years' experience in manufacture of screw-machine work, sheet-metal stampings, typewriters, machine tools and fire arms. Prefers to locate in New England. C-256.

PRODUCTION ENGINEER, age 27. Graduate mechanical engineer with 4 years' machine-shop experience, 3 years' in supervising and following up production including routing, planning and scheduling of work, and the getting up of production reports; one year's experience as head inspector. C-257.

ENGINEER competent to take charge for foreign trade or similar corporation of engineering or executive office, and to act as technical buyer of machinery, tools, equipment, engineering and raw materials. C-258.

GRADUATE M.E. 1917, some drafting, mainly in design and layout of heating and ventilating systems; one year machine-shop work; one year state-road construction work. Recently discharged from engineer officers' training school. Prefer location Middle West. C-259.

MANAGER, SUPERINTENDENT OR CHIEF ENGINEER, extraordinary ability, graduate mechanical and electrical engineer, with 18 years' experience in design, operation, maintenance, and erection of electric railway, power, lighting and Portland cement properties. C-260.

PRODUCTION SUPERINTENDENT OR ENGINEER, 22 years' mechanical experience, from toolmaker to executive. Past 12 years as an executive, thoroughly experienced in modern production methods. Good organizer. American, 40 years of age, married. A-1 references. New England preferred, but would consider other localities. C-261.

MECHANICAL ENGINEERING GRADUATE, single, 30 years old, with 8 years' experience in industrial power problems, combustion engineering and design, construction and operation of steam-power plants, desires position in executive capacity. Capable of taking full charge of office or field work. Was recently discharged from first lieutenant's commission, after a year's service. Salary before entering the service $3,300. Location preferred in New England or the East, will however go anywhere. C-262.

GRADUATE MECHANICAL ENGINEER, desires executive position; 3 years' experience erecting large gas engines and triple-expansion pumping engines; 6 years' experience drafting and designing on automobile work, shipbuilding, transmission machinery and flour-milling machinery. Salary $300 a month. Philadelphia preferred. C-263.

GRADUATE B.S. AND M.E. 1917. Age 32. Shop and junior engineering experience. Ten years instructor of physics and electricity in technical institute. At present in Ordnance Department. Broad experience. Desires opening with opportunities for engineering experience and advancement. Location, New York City. C-264.

GRADUATE MECHANICAL ENGINEER, seeks position as assistant to works or general manager of industrial establishment; one year's construction experience, and 14 months' experience in various departments of large electric light and power company. Seventeen months' military service in technical capacity. C-265.

GRADUATE MECHANICAL ENGINEER, broad experience in executive, selling and financial work. Two and one-half years' buyer of supplies for Allies, export department, J. P. Morgan and Co. Thorough knowledge of advertising and publicity. C-266.

FOREIGN REPRESENTATIVE, M.E., age 39, married, 17 years' professional experience; 7 years manager of electric illuminating and manufacturer's company, in Italy, 9 years' experience in U. S., designing electrical machinery; one year officer in U. S. Army, scientific work in France and Italy. Perfect knowledge of Italian, French and Spanish languages. Desires to represent American industry doing construction work in Europe or exporting to Europe either raw materials or finished products. Location, France or Italy. First-class business relation in above countries. Salary $3,600 to $4,000. C-267.

TECHNICAL GRADUATE in mechanical engineering, University of Pennsylvania. Three years' shop and drafting experience; one year Lieutenant, Ordnance Department, U. S. Army. Age 25. Eastern location preferred. C-268.

SUPERINTENDENT OR WORKS MANAGER, age 45, with over 25 years' experience in working of woods and metals in various lines of manufacture. Personal experience and supervision in drafting pattern room, machine-shop and assembling departments.

Good experience in design of tools, jigs, special machines, modern methods in manufacture and successful handling of help. Good record and references. Salary $3,600 to $4,000. C-269.

MECHANICAL ENGINEER, technical graduate. Five years' experience in production and inspection work on pressed-steel goods and medium-sized machine work. Desires position as assistant to shop superintendent, in production of sheet metal and stampings or small machine products. C-270.

MECHANICAL ENGINEER, technical education, University of Michigan. Desires position of executive nature. Several years directing affairs along lines of manufacturing plant construction, equipment design, operation, production and sales management. Consulting and contracting. Now in Government service directing inspection of steel and manufacturing products and adjusting claims. C-271.

WORKS MANAGER OR SUPERINTENDENT, age 37, married, now engaged in war work, captain Ordnance Department; 18 years' experience from apprentice to plant superintendent in large organization; modern methods of manufacturing munitions, heavy artillery, road-making machinery and locomotives, desires permanent position with large concern; services available about April 1. Salary $5,000 to $6,000 per year. Will consider any location, including foreign connections. C-272.

PRODUCTION ENGINEER, graduate in mechanical engineering, 5 years' experience with machine tools, instruments, power-plant equipment, steel-plant products as designer, estimator and plant engineer with supervision of manufacture and production desires position with engineering staff or as assistant to production manager. C-273.

MECHANICAL ENGINEER. French, 48. Extensive engineering designing and operating experience in U. S., Central and South America. Steam and gas engines, marine and stationary, mining machinery machine tools; 10 years' locomotive construction and supervision. Would like connection with firm having interests in Europe or South America. Now employed by U. S. Ordnance. End of war necessitates change. Highest references. C-274.

MECHANICAL ENGINEER, age 25, technical graduate; 5 years' experience in design and manufacture of high-grade motor vehicles and tractors. Until recently lieutenant in air service engineers. Fully acquainted with the erection, operation, and maintenance of airplanes and aeronautical motors. Speaks French and German slightly. Assistant on production or works management desired. Salary $225. C-275.

MECHANICAL ENGINEER OR ENGINEER OF WORKS. Technical graduate, 34, married. Twelve years' experience. Agriculture machinery, steam engines and boilers, chemical works, factory buildings and maintenance, general manufacturing. Ability as sales engineer. Engineering executive of proved ability capable of acting as head of engineering department, handling technical correspondence and directing design work. Salary $225 a month. C-276.

MECHANICAL ENGINEER, 12 years' experience cranes and hoists, elevating and conveying machinery, bridge machinery. Designing, checking, estimating inspection. Age 30, married. Desires permanent connection in any of following capacities: Assistant purchasing agent, chief draftsman, assistant chief engineer, plant engineer or sales engineer. C-277.

SUPERINTENDENT OR MECHANICAL ENGINEER. Technical graduate, 15 years' practical experience on design, construction, maintenance and operation of industrial works and power-plants. Superintendent of successful airplane-propeller plant. Familiar with machine-shop practice. Will consider sales proposition. Desires connection with concern offering greater opportunities. C-278.

SUPERINTENDENT OR PLANT ENGINEER. Technical graduate, at present employed as superintendent of hull construction in shipyard. Previous experience laying out installation and maintenance of machinery and equipment in large rifle factory, and plant engineer in small shipyard with supervision of design and erection of shops, installation of shop machinery, electrical-service system, and service piping. Present salary $3,600. Location, Eastern States. C-279.

PRODUCTION SUPERINTENDENT. Age 39; desires position as chief engineer, superintendent or manager; 16 years' experience on quantity production of small interchangeable parts accurate mechanical apparatus, tools and dies. Experienced engineer; executive. Prefer location near N. Y. C-280.

CONVEYING ENGINEER. Captain in U. S. army; technically educated, age 34, desires position affording opportunity for executive and engineering ability. Experienced in design and construction of complete conveyor equipments; special machinery; able to handle men; good general business training. Available March 15. Salary $3,500. C-281.

INDUSTRIAL ENGINEER. Graduate M. I. T., age 27; engineer officer, year and a half in U. S. Army; one year with large rubber company, in charge of installing planning department. Good general knowledge of modern methods of factory management. Desire responsible position with progressive manufacturing company or firm of industrial engineers. Available at once. C-282.

EXECUTIVE, GENERAL MANAGER OR SALES MANAGER. Born in New York City; married; graduate mechanical engineer with wide manufacturing, selling and commercial engineer experience; 20 years' record of successful executive accomplishment in this country and abroad for one of the largest industrial corporations having international affiliations; desires permanent connection in executive capacity, or as representative with responsible duties and opportunity to produce results. New York or Eastern location preferred. Highest credentials. C-283.

MAJOR, ORDNANCE DEPARTMENT, United States Army, will be available where executive ability, combined with technical training (M. I. T.) and engineering and business experience, is required. C-284.

MECHANICAL ENGINEER. Technical graduate, age 26, naval officer just released from active duty, having 4 years' experience in steam engineering as both draftsman and engineer. Desires position either in engineering or engineering sales. C-285.

DESIGNING ENGINEER for steam turbines or engines, power plants, etc. Graduate mechanical engineer; age 43; 2 years' recent graduate study abroad; 4 years' teaching engineering; 12 years in design and 4 years in responsible civil-service position in Navy Department. Desires executive position in manufacturing or engineering concern. C-286.

JUNIOR MEMBER, 27, experienced in power-plant and sugar-mill work, estimating and designing in boiler, conveyor and pipe work, and large evaporative apparatus. Salary to start $225 per month. Location, New York City or vicinity. C-287.

PRODUCTION ENGINEER. Graduate mechanical engineer, 9 years experience in practical machine-shop and foundry practice and production and cost-office methods. Desires permanent connection in executive capacity. Recently discharged from army; 30 years old; married; salary $3,000. C-288.

NAVAL ARCHITECT. Graduate M. I. T., with 17 years' experience in shipbuilding and engineering in charge of work. At present inspector with Navy Department. Position in production department of shipyard desired. Will accept moderate salary. C-289.

ENERGETIC YOUNG ENGINEER, 26, M.E. graduate 1915, with shop, field, laboratory, experimental, and drafting room experience on tractors, motor trucks and gas engines, desires to connect with firm to train into specialist on oil engines or refrigeration machinery. Salary $150 a month. C-290.

MECHANICAL ENGINEER and designer with many years experience as an industrial engineer and draftsman desires to have work at home for his leisure time, from a few industrial plants in the vicinity of his home, whose size and volume of work does not warrant the steady employment of an engineer draftsman. Located in the New York City district within quick access of nearly all the principal cities of northern New Jersey. C-291.

MECHANICAL ENGINEER OR WORKS MANAGER, 19 years successful and practical experience, including electrical and steam engineering, installation, maintenance, production and organization. Well-developed executive ability. Salary $4,000. Preferred location near New York or Philadelphia. C-292.

MEETINGS OF LOCAL SECTIONS

(See also page 293 of Section One)

ATLANTA SECTION

On Saturday, February 1, the Atlanta Section tendered a dinner to Secretary Rice at the Druid Hills Golf Club.

In the afternoon Secretary Rice addressed the students at Georgia School of Technology, later inspecting the model power plant which has just been completed at the school.

ROBERT GREGG,
Chairman.

BIRMINGHAM SECTION

On February 3 the Birmingham Section held a meeting at the Southern Club. The speakers were R. W. McWane, president of the American Cast Iron Pipe Company, and Colonel T. O. Smith, vice-president of the Birmingham Trust and Savings Company. The former spoke on Efficiency Work in the Emergency Fleet Corporation, while the subject of Colonel Smith's address was Finance. Secretary Rice attended the meeting and addressed the members.

W. P. CAINE,
Chairman.

BOSTON SECTION

A dinner was held on January 31, in honor of Past-President Main. [An account of this dinner appears on page 262 of Section One.—EDITOR.]

ELMER SMITH,
Secretary.

CINCINNATI SECTION

One of the most successful meetings ever held by the Cincinnati Section occurred on February 1 at the Business Men's Club. The guests of honor were the Honorable John Galvin, Mayor of Cincinnati, and Major Bert L. Baldwin, a member of the Section who had just returned from France.

The city of Cincinnati is contemplating a number of large engineering projects including a rapid-transit system of electric railways. Terminal facilities for the steam roads entering the city are also discussed frequently, the construction of which would run into many millions of dollars. The rapid-transit system will very likely be financed by the city and it is probable that the terminal facilities will affect the city's finances to some extent. For this reason it

was believed that a talk by the chief executive of the city on Financial Problems of Cincinnati would be most timely and interesting.

Major Bert L. Baldwin has long been recognized as one of the most popular members of the Cincinnati Section and his return from service in France was the occasion of many expressions of admiration and affection. His address was a plain talk on the conditions in France in the light-railways service. He described graphically various bombardments that had been suffered by the men under his command and gave an idea of the problems that had to be solved in the storage and care of the stupendous quantities of munitions that were being gathered for the great drive.

On the evening of February 17 the Cincinnati Section held a meeting at the Ohio Mechanics Institute, at which Secretary Rice spoke informally.

JOHN T. FAIG,
Secretary.

CLEVELAND SECTION

The Cleveland Section held a quarterly all-day convention on February 4. Registration began at nine o'clock, and two addresses were given during the morning session: Rubber and Its Manufacture, by Professor H. E. Simmons of Akron, and Electric Traveling Crane Development, by G. W. Shem, of the Alliance Machine Company. The latter was illustrated with lantern views.

Luncheon at 12.30 was followed by an address on Experiences of Engineers in France, by Colonel J. R. McQuigg.

An inspection trip to the National Acme Manufacturing Company's plant occupied the afternoon, after which a dinner was held at the University Club. C. A. Otis of the War Industrial Board and Lieutenant Colonel G. M. Barnes of the Ordnance Department gave an illustrated account of how the big guns were developed.

E. S. CARMAN,
Chairman.

CONNECTICUT SECTION

New Haven Branch

G. Douglas Wardrop, Editor of the *Aerial Age Weekly*, delivered an address before the New Haven Branch and the Engineers' Club, at Lampson Lyceum, Yale University, on Friday, January 31, the subject being War Aviation in Retrospect; Commercial Aviation in Prospect.

J. A. NORCROSS,
Chairman.

ERIE SECTION

On February 19 the Erie Section held a meeting at the Commerce Restaurant, which Secretary Rice attended and addressed. The governing board of the Engineers' Society of Northwestern Pennsylvania and the officers of the Local Section of the A.I.E.E. were invited.

M. W. SHERWOOD,
Chairman.

MILWAUKEE SECTION

On February 13 Secretary Rice addressed the members of the Milwaukee Section, the Board of Directors of the Engineers' Society of Milwaukee and officials of the various Local Sections at the Milwaukee Athletic Club.

FRED H. DORNER,
Secretary.

MINNESOTA SECTION

The section was entertained at dinner Monday evening, February 10, by the Minneapolis Steel & Machinery Co., James L. Record, president. Secretary Rice was the guest of honor, and addresses were made by him and by John R. Allen, Max Toltz and James L. Record.

J. A. TEACH,
Secretary.

NEW YORK SECTION

The New York Section joined with the members of the other Founder Societies on February 10 when the delegates to the Joint Engineering Congress held in Paris, who had just returned, spoke informally on matters relating to the work of that Congress, and on general conditions in France.

The Section's regular monthly meeting was held on the 24th, in the Engineering Societies Building. The Session opened at 5.30, when an address was given by Peter P. Dean, Mem. Am. Soc. M.E., on the Application of Electrical Control to Gate Valves, illustrated with lantern slides. A buffet supper was served at six-thirty, followed by an address on the Application to Industry of the Personnel Work in the U.S. Army, by Lieutenant-Colonel J. J. Swan, Mem. Am. Soc. M.E. At the close of this address, motion pictures of animated technical drawings for commercial and scientific use, showing electrical starting and lighting systems, the Burroughs adding machine, etc., were shown.

W. W. MACON,
Chairman.

PHILADELPHIA SECTION

The Section held an out-of-town meeting at Wilmington, Delaware, on February 19. Dinner was held at the Hotel du Pont, and the paper was delivered by F. A. Wardenburg, assistant chief engineer of E. I. du Pont de Nemours & Co., on the subject of Power Developments of the Old Hickory Plant.

The regular Section meeting occurred on February 25 at the Engineers' Club. Lieut.-Col. E. B. Morden, the constructing Quartermaster at Philadelphia spoke on the Work of the Construction Division of the Army from Coast to Coast.

JOHN P. MUDD,
Secretary.

PROVIDENCE ENGINEERING SOCIETY

The Third Annual Banquet of the Society was given at the Narragansett Hotel on February 12. Among the speakers were P. H. W. Ross, President of the National Marine League of the U.S.A., Leonard W. Cronkite of Boston, Special Agent for the U.S. Department of Labor, Captain Delport of the French Army, representing the French High Commission, Lieutenant J. A. H. Muirhead, Engineer, officer of the British Army, and Alfred D. Flinn, Secretary of the Engineering Council.

As an added feature moving-picture films of the assembling and operation of the 14-inch naval guns at the front were shown by Ensign C. S. McCrae, U.S.N.R.F., of the Naval Bureau of Ordnance.

W. A. KENNEDY,
Secretary.

ST. LOUIS SECTION

On January 24 the members of the St. Louis Section met in the Daniel Boone room of the Statler. J. M. Olvin, vice-president of the Western Cartridge Works, spoke on the Manufacture of Army Rifle Cartridges.

The Associated Engineering Societies of St. Louis held a joint meeting under the auspices of the St. Louis Section of the A.S.M.E. at the club rooms on January 29. L. C. Nordmeyer gave an illustrated talk on Refrigeration and Eggs in China. Mr. Nordmeyer had just returned from his second trip to China in connection with the desiccated-egg industry.

A special dinner meeting of the Section was held on the evening of February 6, at the Hotel Statler, in honor of Secretary Rice, who was the guest and speaker of the evening. Mr. Rice discussed at length the relations between the parent society and the various sections.

J. P. MORRISON,
Secretary.

SAN FRANCISCO SECTION

On February 13, the Section held a meeting at the Engineers' Club. F. A. Anderson, Electric Inspector of the U.S. Shipping Board, gave an address on Electric Arc Welding. Interesting lantern slides were shown and there was opportunity for a full discussion of the relative merits and different uses of electric-arc and oxy-acetylene welding.

GEORGE L. HURST,
Secretary.

WORCESTER SECTION

The February meeting of the Worcester Section took place on February 19 at the electrical engineering laboratories of the Worcester Polytechnic Institute. Supper was served there at 6.30 p.m. and a lecture given at 7.45 by M. Eskil Berg of the General Electric Company, who talked on the subject of Recent Development of Propelling Machinery for War and Merchant Vessels. Dean M. E. Cooley, President of the Society, was present as the guest of Dr. Hollis.

CHESTER T. REED,
Secretary.

Meetings of Student Branches

ARMOUR INSTITUTE OF TECHNOLOGY

January 8. At the first meeting of the Student Branch of the A.S.M.E. since the end of the Government régime at the Institute it was decided to start the affairs of the year with a Smoker to which all engineering students of the college would be invited.

Professor George F. Gebhardt, head of the department of Mechanical Engineering, addressed the meeting on the purpose of the A.S.M.E. Student Branches and the benefits to be derived from such affiliation. He pointed out that the real object to be gained by Student Branch meetings is to give the students the benefit of making addresses in public, as one of the most essential things in later life is to be able to speak on a subject for which no preparation has been made.

The following officers were elected for the year: H. Rehfeldt, chairman; J. A. Keith, vice-chairman; H. G. Anderson, secretary, and C. Carlson, treasurer.

HAROLD G. ANDERSON,
Branch Secretary.

BUCKNELL UNIVERSITY

February 3. A very interesting meeting was held, the subject of which was a debate on whether or not the smaller college is better for the engineer than the larger one. Following the debate the senior students tendered a spread to the juniors and underclassmen.

C. W. WITHINGTON,
Branch Secretary.

CARNEGIE INSTITUTE OF TECHNOLOGY

January 17. The first meeting was held for the purpose of reorganizing the Branch and the following officers were elected: C. E. Powell, chairman; T. W. Allsworth, vice-chairman; P. D. Wersant, treasurer, and D. C. Saylor, secretary.

DAVID C. SAYLOR,
Branch Secretary.

CASE SCHOOL OF APPLIED SCIENCE

December 6, 1918. The Case Mechanical Club held its first meeting of the year. The late start of the club's activities has been due to the war-time conditions existing at the school. Nevertheless the meeting was well attended and the future success of the club assured.

The speaker of the evening was Mr. Willard Beahan, first assistant engineer, N.Y.C.R.R., who addressed the members on the subject Human Engineering. In his talk he brought out the problems which confront the engineer in the hiring and handling of men. Also he discussed the present labor situation and his hopes for settled labor conditions after the return of the army from abroad.

December 20, 1918. The Development of the Rolls-Royce Aero Engine, prepared by Maurice Olley, chief engineer, was read by Thomas Nadin, superintendent of Rolls-Royce, Ltd., in America.

The following officers were elected for the Student Branch, year 1918-1919: Prof. F. H. Vose, honorary chairman; R. W. Burdett, chairman; R. T. McCune, vice-chairman, and E. L. Yesberger.

January 8. Harry Clark of the Y. M. C. A. branch of the War Industries Board delivered an interesting address on Scientific Management from the Man's Standpoint in which he pointed out that one of the chief causes of labor trouble today is the fact that the working man is kept in ignorance of working conditions.

E. L. YESBERGER,
Branch Secretary-Treasurer.

UNIVERSITY OF CINCINNATI

January 10. A business meeting was held at which the following officers were elected: Prof. A. L. Jenkins, honorary chairman; L. H. Smith, chairman; A. H. Knebel, vice-chairman, and C. L. Koehler, secretary-treasurer.

Dean Schneider of the Engineering College presented an opening address upon the future of the Engineering College at the Cincinnati University.

February 13. Major Bert Baldwin, Mem. Am. Soc. M.E., spoke upon The Status of the Engineer in the Great European Conflict and told of the wonderful transportation facilities, the immense warehouses and the elaborate systems of roads and bridges which the American Engineering Corps had to build and maintain.

Captain R. C. Bunge spoke upon what he called The Infantryman's Side of the Story, describing the various engagements of his division (148th Infantry, 37th Division) in the St. Mihiel and Chateau Thierry drives.

Mr. Galbraith as Chairman of the Cincinnati Section of the A.S.M.E. invited the members of the University of Cincinnati Student Branch to hear an address given by Mr. Rice on February 17.

C. L. KOEHLER,
Branch Secretary-Treasurer.

LELAND STANFORD, JR. UNIVERSITY

January 15. The Stanford Branch held its first meeting of the quarter which proved to be a most successful one. Professor Leslie, head of the propeller-testing laboratory, gave an interesting talk on The Relation of the Model Propeller to Actual Propeller. Following this talk President Kellogg read a paper from the Duluth Engineering Club, and was authorized to name a committee to ascertain and make a report on the opinion of the Branch members concerning the consolidation of the engineering societies. Arrangements were then made for visiting certain foundries and steel works in San Francisco.

C. D. HOWE,
Branch Secretary-Treasurer.

LOUISIANA STATE UNIVERSITY

January 31. A meeting was called for the purpose of organizing the Louisiana State University Student Branch of the A.S.M.E. for the session of 1919.

Professor A. Guell, honorary chairman, explained the advantages of the Student Branch of the A.S.M.E. and also of the National Society to the students.

CLIFFORD COLOMB,
Branch Secretary.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

January 22. A business meeting was held at which the following officers were elected: Prof. E. F. Miller, honorary chairman; H. O. Davidson, chairman; S. Wells, vice-chairman; F. C. Spooner, secretary, and G. I. Brown, treasurer.

February 7. The speaker of the evening Lieut. Atwood P. Dunham, recently returned from the Tank Service, delivered a most interesting account of his experiences and training. He explained the mechanism of the different tanks used by the English and French, together with the mechanical appliances that were improved, and the method of barrage, in order to outwit the enemy. The account of his being submarined relates one of the most hazardous experiences of the men who went overseas.

At the close of the meeting, Chairman H. O. Davidson called upon heads of the several committees to report on the trip to the Waltham Watch Factory.

FREDERICK C. SPOONER,
Branch Secretary.

UNIVERSITY OF NEBRASKA

January 22. This being the first meeting of the year it was given over to the professors for the purpose of introducing the new students to the College of Engineering of the University of Nebraska.

No organization was perfected during the first semester due to the interference of the Student Army Training Corps and Student Navy Training Corps.

During the past year much vocational training for war work was given to drafted men and the school is just now readjusting itself to pre-war conditions.

W. L. MILLAR,
Branch Secretary.

UNIVERSITY OF OKLAHOMA

January 14. The following officers were elected for the ensuing year: Geo. L. Barker, chairman; Irving Posey, vice-chairman; Floyd E. Waterfield, Jr., secretary, and T. J. Bode, treasurer.

Mr. George L. Barker, the Chairman of the Branch, gave an address briefly setting forth the history and purpose of the Society and its work for the remaining part of the year. Mr. C. D. Reaser gave a talk in regard to his experiences and associations during the summer with a power plant which is being built by the Oklahoma Power and Transmission Company of Shawnee, Okla. A brief talk on solid and liquid fuels and an interesting comparison of their heating values and the type of fuel which gives the highest efficiency with certain standard types of boilers was given by Mr. T. J. Bode. The Mechanical Engineer and His Place in Present Reconstruction was given by Mr. Glenn Meadows, in which he set forth the probable part the mechanical engineer would play in reconstruction in the United States and abroad.

FLOYD E. WARTERFIELD, JR.,
Branch Secretary.

OREGON STATE AGRICULTURAL COLLEGE

January 29. A meeting was held reorganizing the Student Branch and the following officers were elected: Prof. G. A. Covell, honorary chairman; Ben Nichols, chairman; J. Luebke, vice-chairman; J. L. Holden, Secretary, and R. Gregg, treasurer.

G. A. COVELL,
Branch Honorary Chairman.

PURDUE UNIVERSITY

January 15. The first meeting of the year was held for the purpose of arousing the interest of the underclassmen, especially the freshmen, in the society. Professor G. A. Young gave an address on the subject of The Purpose of the A.S.M.E. Professor L. V. Ludy followed with a talk dealing with the relationship of the student branch with the national society. Professor R. W. Noland told of the benefits to be derived from membership in the Society.

January 28. Professor L. V. Ludy gave a very elaborate and interesting report of this year's meeting of the Indiana Engineering Society, held at Indianapolis. Many members of the Purdue faculty hold membership in this state society. Professor Young of Purdue was elected president of the society for the coming year.

ROBERT S. ERNST,
Branch Corresponding Secretary.

YALE UNIVERSITY

January 15. A business meeting was held at which thirty-seven members of the senior and junior classes joined the Student Branch.

January 31. A Joint Meeting of the A.S.M.E. New Haven Branch and the Yale Mechanical Engineers' Club (A.S.M.E. Student Branch) was held at which Mr. G. Douglas Wardrop, Editor *Aerial Age Weekly*, delivered an illustrated lecture on War Aviation in Retrospect; Commercial Aviation in Prospect.

WM. L. AUSTIN, JR.,
Branch Secretary-Treasurer.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER MARCH 18

BELOW is a list of candidates who have filed applications since the date of the last issue of THE JOURNAL. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 189.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by March 18, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

Alabama

CARPENTER, THOMAS J., Steam Engineer, Semet Solvay Company, Ensley
STEELE, WILLIAM T., Superintendent of Equipment, Cyanamid Division, Air Nitrates Corporation, Muscle Shoals

California

DITTUS, FRED W., Chief Draftsman, Standard Oil Company, El Segundo
TAYLOR, RALPH T., Helper, Marine Machine Department, Los Angeles Shipbuilding & Drydock Co., San Pedro

Connecticut

BRINK, FREDERICK, Assistant Equipment Engineer, Union Metallic Cartridge Company, Bridgeport
BULL, RICHARD S., Sales Manager, Whitlock Coil Pipe Company, Hartford
CLARK, HENRY M., JR., 1st Lieutenant Ordnance, U. S. A., Assistant to the Army Inspector of Ordnance, Winchester Repeating Arms Company, New Haven
DICKHAUT, SAMUEL A., Production Engineer, Bullard Engineering Works, Inc., Fairfield
ENNIS, ROY C., Inspector of Ordnance, Winchester Repeating Arms Company, New Haven
FELL, WILLIAM, Foreman of Repair Department, Union Metallic Cartridge Company, Bridgeport
KING, HARRY A., Lieutenant, Ordnance Department, U. S. A. Army Inspector of Ordnance, Wallace Barnes Company, Bristol
MCCARREN, JOHN F., Assistant Army Inspector of Ordnance, U. S. A., Wallace Barnes Company, Bristol
MALLIET, WILLIAM H., Chief Engineer, M. S. Little Manufacturing Company, Hartford
ROGERS, CHARLES F., Chief Inspector, U. S. Ordnance Department, Colt's Patent Fire Arms Manufacturing Company, Hartford
WILLIAMS, JAMES, Shop Superintendent, The Terry Steam Turbine Company, Hartford

District of Columbia

HOFFMAN, LESLIE A., Assistant Physicist, Bureau of Standards, Washington
HOLMES, RALPH A., Chief Computer, Ry. & Seacoast Section, Engineering Bureau, Washington
JONES, THOMAS R., Captain, U. S. A., Washington
MARSHALL, RICHARD C., JR., Chief of the Construction Division of the Army, Washington
SPIVEY, WILLIS T., 1st Lieutenant, Freight Handling Equipment Expert, Engineering Unit, Washington
TRAEGER, CHARLES H., Major, Ordnance Department, U. S. A., Washington
WEAKLEY, FLOYD L., Consulting Engineer, Ordnance Department, Nitrate Division, Washington

Illinois

BROWN, HENRY A., Captain, Ordnance Department, U. S. A., Rock Island Arsenal, Rock Island
CHRISTENSEN, NORMAN V., Consulting Engineer, Simonds Manufacturing Company, Chicago
DIERKS, LOUIS E., Assistant Engineer, Sauerman Brothers, Chicago
FREI, JOHN J., Chief Draftsman, American Steel Foundries, East St. Louis
GALLERY, DANIEL J., Sales Engineer, Crane Co., Chicago
MATHENY, CHESTER R., General Manager, Republic Flow Meters Company, Chicago
PESTELL, WILLIAM, Western Sales Manager, Sanford Riley Stoker Company & Murphy Iron Works, Chicago
STELLEY, HARRY A., Superintendent of Construction, Sauerman Brothers, Chicago
STOCKFLETH, BERGER, Research Laboratory Engineer, International Harvester Company, Chicago
SULLIVAN, WILLIAM B., Manager, Rich Tool Company, Chicago
WHITSEL, T. S., Assistant to General Manager, Union Special Machine Company, Chicago

Indiana

HAWKINS, EDWARD P., Secretary & Works Manager, Connersville Furniture Company, Connersville
PRUITT, ORAN M., President, Indiana Air Pump Company, Indianapolis

Louisiana

BURBANK, EDWARD W., Sales Engineer, Allis-Chalmers Manufacturing Company, New Orleans

Maine

HALL, ALFRED E. B., Mechanical Engineer, Eastern Manufacturing Company, Lincoln

Maryland

BARTON, CHARLES E., U. S. Government District Gauge Supervisor, Baltimore
BENSCOTER, FRANK L., Lieutenant, Ordnance Department, U. S. A., Aberdeen Proving Grounds, Aberdeen

Massachusetts

CHANDLER, JOSEPH C., Engineering Assistant, Watertown Arsenal, Watertown
DUCLOS, MELVILLE W., Engineering Factory Layout, Hendee Manufacturing Company, Springfield
HAMILTON, ARTHUR L., Assistant in Physics Department, Massachusetts Institute of Technology, Cambridge
JONES, LAWRENCE W., Chief Inspector, Inspection Division, Ordnance, U. S. A., Newton Manufacturing Company, Lowell
KAO, TA KANG, Assistant to Chief Engineer, American Whaley Engine Company, Boston
KATZENSTEIN, LEON L., Head of Mechanical Laboratory, Norton Company, Worcester
KERN, RAYMOND T., Chief Engineer, The Jennison Company, Fitchburg
LANGWORTHY, ROSS A., Engineer, Stone & Webster, Boston
MERRILL, FREDERIC E., Cooley & Marvin Company, Boston
MOREHEAD, FRENCH H., Assistant to Vice-President, Walworth Manufacturing Company, Boston
ORR, CLAUD H., Senior Engineer, Cooley & Marvin Company, Boston
SANFORD, GEORGE E., Safety Expert, General Electric Company, West Lynn
SARGENT, CHARLES R., Designing Draftsman, Norton Grinding Company, Worcester
SMETHURST, JARVIS R., Chief Engineer & Master Mechanic, Dwight Manufacturing Company, Chicopee
WELLES, WILLIAM A. M., Assistant to Production Manager, Ordnance Department, U. S. A., Watertown Arsenal

Michigan

LONG, JOHN J., 1st Lieutenant, Air Service, U. S. A., Packard Motor Car Company, Detroit
MOORE, WHITLEY B., Ensign, U. S. Naval Auxiliary Reserve Force, Coldwater
MUELLER, CHRISTIAN R., Mechanical Engineer, Ford Motor Company, Detroit

Missouri

LOTTMAN, WALTER F., Student, University of Missouri, Rolla
STEPHENS, ROBERT R., Sales Engineer, Colcord Wright Machinery & Supply Company, St. Louis

Nebraska

SOLTOW, LAWRENCE M., Erecting Engineer, The Refinite Company, Omaha

Nevada

TOMPKINS, PHILIP E., Mechanical Designer & Draftsman, Nevada Consolidated Copper Company, Ruth

New Jersey

BENSON, LEE H., Works Manager, Walter Scott & Co., Plainfield
DOBELBOWER, JOHN C., Assistant Mechanical Engineer, Crocker Wheeler Company, Ampere
HARDGROVE, RALPH M., Power Plant Test Engineer, New Jersey Zinc Company, Franklin
HASSALL, WILLIAM H., Engineer of Construction Department, Worthington Pump & Machinery Corporation, Harrison
HULSART, CHARLES A., Final Inspector, Stationary Drafting Department, Babcock & Wilcox Company, Bayonne
INSLEY, ROBERT, Ensign, U. S. N., Hoboken
MILLINGTON, CALDWELL N., Mechanical Designer, Crocker-Wheeler Company, Ampere
PARSONS, C. W. S., Rahway
THURNER, HJALMER S., Chief Inspector, Ordnance Inspection Division, U. S. A., Sloan & Chace Manufacturing Company, Newark
WILMOT, CHARLES S., Mechanical Superintendent, MacArthur Brothers Company, Woodbury

New York

ANDERSON, WILLIAM S., JR., Ensign, Chief Expediter, New Jersey District, Inspector of Engineering Material, Bureau of Steam Engineering, Brooklyn
ANGUS, WILLIAM J., Designer, The New York Edison Company, New York
BEHRMAN, HENRY, Assistant Engineer of Tests, Mechanical Laboratory, Navy Yard, New York
BROWN, HAROLD P., Manager Concrete Atomizer, New York
BRYANS, WILLIAM R., Associate Professor, School of Applied Science, New York University, New York
CAREY, WILLIAM J., Assistant Appraisals Expert, Bureau of Aircraft Production, New York
CHADWICK, JOHN C., Salesman, Packard Motor Car Company of New York, New York
CHASE, CHAUNCEY L., Maintenance Engineer, Bayles Shipyard, Incorporated, Port Jefferson
CLENDINNING, WILLIAM R., Mechanical Engineer, Nason Manufacturing Company, New York
CLINE, JEROME G., Hoist Specialist, Sprague Electric Works of General Electric Company, New York
COMPTON, RALPH O., Brooklyn
CRANDELL, WILLIS S., General Manager, Paper Mills, A. P. W. Paper Company, Albany
CROWLEY, JOHN C., Chief Electrician, U. S. N. R. F., New York
DE LA MONTE, CHARLES H., Experimental Engineer, International Motor Company, New York
FELDMANN, ALFRED, Steam Tester, Brooklyn Rapid Transit System, Brooklyn
FIGEE, WILLIAM F., Salesman, Young, Corley & Dolan, Incorporated, New York
FORTH, CARL H., Lieutenant, U. S. Navy, U. S. S. Vestal, New York
FRENCH, WILLIAM H., Superintendent Gun Carriage Plant, New York Air Brake Company, Watertown
GLEESON, JOHN M., Assistant Inspector of Engineering Material, U. S. Navy, Hastings-on-Hudson
HAMERSLEY, CARL S., President, Hamersley Manufacturing Company, New York

HENKEL, RICHARD V., Production Engineer, Wallace & Tierman Company, Incorporated, New York
HERTER, CHARLES H., Sales Engineer, Charles A. Schieren Company, New York
HIER, FREDERICK P., JR., Attorney-at-Law, New York
HOCHETTE, HENRY E., Brooklyn
JOFFE, BENEDICT, Consulting Engineer, Special Machine Tool Engineering Works, New York
LEWIS, NATHAN E., Mechanical Engineer, The Babcock & Wilcox Company, New York
McKEE, JOHN H., Mechanical Draftsman, Watervliet Arsenal
MANAS, VINCENT, Assistant Engineer, W. G. Cornell Company, New York
MOEN, LEVI W., JR., Chief Inspector, New York Air Brake Company, Watertown
MONTGOMERY, WARREN B., Industrial Engineer, C. E. Knoeppel & Company, Incorporated, New York
ORCHARD, THOMAS P., Sales Engineer, Service Engineering Company, New York
PINDER, PERCY H., Treasurer, Standard Steam Specialty Company, Incorporated, New York
ROSENBERG, HARRY B., Mechanical Draftsman, E. W. Bliss Company, Brooklyn
SHEARER, THOMAS J., Foreman, Presto Machine & Tool Company, Brooklyn
SLOAN, CURTIS W., Ensign, U. S. N., New York
SMITH, ELWYN L., Production Department, L. C. Smith & Brothers, Syracuse
SMITH, PAUL A., Lieutenant of Engineers, U. S. Coast Guard, Navy Yard, New York
SPLITT, WALTER H., Sales Engineer, Baker-Dunbar-Allen Company, New York
TAYLOR, W. HETHURINGTON, Publisher, The Iron Age, New York
TENNEY, ASHTON M., Textile Engineer, Wellington Sears & Company, New York
THOMPSON, CLYDE, Machinist, U. S. N., U. S. S. Cummings, New York
TRAVIS, THURLOW, Chief Engineer, Knox Hat Company, Brooklyn
UNDERWOOD, ENOCH W., General Manager, Arbuckle Brothers, Brooklyn
VERA, JESSE E., Associate Editor, A.S.M.E., New York
VISCHER, ALFRED, JR., Mechanical Engineer, International Radio Telegraph Company, New York
WAGER, ROBERT H., President, Wager Furnace Bridge Wall Company, Incorporated, New York
YOUNG, EVERETT G., Calculator, American Locomotive Company, Schenectady

North Carolina

ANGUS, HARRY H., Supervising Mechanical Engineer, U. S. A. General Hospital 19, Ashville

Ohio

BISSMEYER, ALBERT H., Plant Engineer, The Cincinnati Milling Machine Company, Oakley
DOANE, SAMUEL E., Chief Engineer, National Lamp Works of General Electric Company, Cleveland
ELLMAN, LOUIS, Chief Engineer, Hagan Corporation, Cleveland
FREED, LORING, Gas Experimental Work, Toledo Railways & Light Company, Toledo
GRAEFENHAN, ARTHUR H., Chief Draftsman, Oesterlein Machine Company, Cincinnati
HALSEY, GEORGE D., Employment Manager, Cincinnati Milling Machine Company, Oakley
KELLOGG, CHARLES G., Assistant General Manager, Cincinnati Frog & Switch Company, Cincinnati
McADAMS, JOSEPH E. President & General Manager The Gem City Machine Company, Dayton
PHEGLEY, FRANK G., Manager, Warren Webster & Company, Cleveland
ROBINSON, ALMON L., Checker, Engineering Department, U. S. Naval Ordnance Plant, Dayton
SEELBACH, KURT L., Engineer Officer, U. S. N. R. F., E. Cleveland
STRAIT, CLAY M., Engineer in charge of Manufacturing Methods and Time Study Work, Cincinnati Milling Machine Company, Cincinnati
UTZ, JOHN GILMORE, Director of Engineering, Standard Parts Company, Cleveland
WAGENER, ROBERT N., Assistant Manager & Mechanical Engineer, Wagener Steam Pump Company, Canton
WOLF, CLARENCE F., Production Manager, Eclipse Stove Company, Mansfield

Oklahoma

JOHNSON, MELVILLE L., Refinery Engineer, W. G. Williams, Consulting Engineer, Oklahoma City

Pennsylvania

ALLEN, WILLIAM N., Jr., Rate Man, Westinghouse Electric & Manufacturing Company, East Pittsburgh
BROWN, GEORGE E., Captain, Ordnance Department, Aluminum Company of America, Pittsburgh
DENK, FRANZ J., Consulting Mechanical and Fuel Engineer, Pittsburgh
EWER, ROLAND G., Mechanical Engineer, The Carbondale Machine Company, Carbondale
GREENBERG, ELMER H., Mechanical Engineer, C. H. Wheeler Manufacturing Company, Philadelphia
LITTELL, HOBART L., Sales Engineer, Hyatt Roller Bearing Company, Philadelphia
LUCK, COURTLANDT, Efficiency Engineer, Midvale Steel & Ordnance Company, Philadelphia
McCABE, EDWARD B., Chief Draftsman, The Carbondale Machine Company, Carbondale
MAILLER, JOHN P., Electrical Engineer, Buffalo, Rochester & Pittsburgh Railroad, Du Bois
MILLER, ROBERT N., Assistant Engineer, Pennsylvania Railroad Company, Altoona
MOORE, WILLIAM A., Construction Engineer, Dougherty & Bachran, Philadelphia
NEFF, RUSSELL M., Mechanical Engineer, Neff Brothers, Allentown
RISHEL, HARRY A., Mechanical Engineer, H. W. Johns-Manville Company, Philadelphia
THOMAS, JOHN B., Chief Inspector, The Westinghouse Electric & Manufacturing Company, Machine Works, E. Pittsburgh
TOLER, JAMES P., Chief Engineer, Crescent Portland Cement Company, Wampum
WORD, Richard G., Sales Engineer, Yarnall Waring Company, Philadelphia

Rhode Island

BURROWS, WILLIAM D., Chief Draftsman, Providence Gas Company, Providence
HOLLEMAN, HOWARD I., Electrical Mechanical Engineer, Naval Training Station, Newport

Tennessee

TROOP, EUGENE F., Power Supervisor, Dupont Engineering Company, Jacksonville

Texas

BURNSIDE, MORRIS C., Major, Engineer Officer, Aviation Repair Depot, U. S. A., Dallas
HECHS, ERNST D., Technical Engineer, Goodyear Tire & Rubber Company, Dallas
UDDEN, MAURITZ S., Engineer, Tennant-Lovegrove Company, Houston

Virginia

ANDERSON, ST. GEORGE M., Superintendent Rolling Mills, Foundries & Machine Shops, The Tredegar Company, Richmond
BURNARD, JAMES J., Marine Draftsman, Newport News Shipbuilding & Dry Dock Company, Newport News
HOOPER, MARTIN T., Mechanical Engineer, Virginia Shipbuilding Corporation, Alexandria

Wisconsin

BALLENTINE, JAMES M., Gas Power Engineer, International Harvester Company, Milwaukee
FALK, GORDON S., Engineer, The Falk Company, Milwaukee
REICH, ALBERT, Industrial Engineer, Nash Motors Company, Kenosha
RUEGG, CLEMENT, Mechanical Engineer, Nordberg Manufacturing Company, Milwaukee

Australia

SAENGER, GEORGE W., General Manager, Maize Products Pty. Limited, Melbourne

Canada

BARDSLEY, JOHN W., Chief Draftsman, Canadian Milk Products, Limited, Toronto, Ontario
LEWIS, JAMES T., General Superintendent, The John Inglis Company, Limited, Toronto, Ontario

England

IRONSIDE, GEORGE, Ordnance Draftsman and Machine Gun Expert, London

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE MEMBER

Indiana

WOOTTON, HARRY C., Assistant Superintendent, Aircraft Division, Nordyke & Marmon Company, Indianapolis

Michigan

FIGEE, J. H., Engineer, Steere Engineering Company, Detroit

Missouri

HELMREICH, LOUIS W., Assistant Mechanical & Electrical Engineer, Missouri Public Service Commission, Jefferson City

New Jersey

EISLER, CHARLES, Chief Designer & Engineer, Westinghouse Company, Bloomfield

New York

LAZEAR, WESTON B., District Manager, Stephens Adamson Manufacturing Company, New York

Ohio

WHITE, PERCIVAL, Research Engineer, Aluminum Castings Company, Cleveland

Pennsylvania

BACH, GEORGE W., General Manager, Union Iron Works, Erie
FISK, GUSTAF L., Chief Engineer, Central Iron & Steel Company, Harrisburg

PROMOTION FROM JUNIOR

Illinois

KENT, EDWARD R., 1st Lieutenant, Ordnance Department, U. S. A., Rock Island

Kansas

CALDERWOOD, JAMES P., Professor of Steam & Gas Engineering, The Kansas State Agricultural College, Manhattan
PITTS, GUY C., Assistant Mechanical Engineer, Federal Shipbuilding Co., Kearney

New York

HUTTON, MANCIUS S., New York
THAYER, ROBERT E., Mechanical Department Editor, Railway Age, New York

Ohio

RHAME, FRANK P., Captain Ordnance Department, U. S. A., Cincinnati
SEEM, CHARLES B., Sales Engineer, Electric Furnace Company, Alliance

Pennsylvania

DANKS, ALFRED C., Superintendent Water & Steam Department, Edgar Thompson Works, Carnegie Steel Company, Braddock
MOORE, H. L., District Manager, Buffalo Forge Company, Pittsburgh
MORTON, JOHN W., Assistant Engineer in charge Diesel Engine Department, U. S. Shipping Board, Philadelphia
ROSE, EDWARD E., Mechanical Engineer, Control Division, Westinghouse Electric & Manufacturing Company, East Pittsburgh

Wisconsin

PACKARD, HORACE N., Development Engineer, Cutler-Hammer Manufacturing Company, Milwaukee

Central America

ECHEVERRIA, RICARDO J., Dean in the National University of Guatemala, (Reinstatement), Gautemala City

SUMMARY

New Applications 168
Change of Grading:
Promotion from Associate Member 8
Promotion from Junior 13
Total 189

Two Sections—Section Two

Volume 41 Number 4

MECHANICAL ENGINEERING

THE JOURNAL OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

April, 1919

Society Affairs

A Record of the Current Activities of the Society, Its Members, Council, Committees, Sections and Student Branches; and Affairs of Interest to the Membership

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
29 West 39th Street, New York

Spring Meeting

Remember the Spring Meeting to be held at Detroit, June 16 to 19. *The Meeting starts on Monday,* instead of Tuesday as has been the usual custom. Headquarters at Hotel Statler. Announcement of the various sessions and entertainment will be found on page 404 in Section 1 of this number. The Committee on Meetings and the Detroit Local Committee are preparing to make this a big event and the main thing now is to reserve the date and secure your rooms.

Coming Sections Meetings

April 2: At Johns Hopkins University, as one of the series of Aldred lectures, D. D. Thomas, Chief Engineer of the Baltimore Dry Docks and Shipbuilding Co., Baltimore, Md., will speak on the Modern Steel Freight Ship.

The Buffalo Section will hold a meeting in the rooms of the Buffalo Engineering Society, the speaker and subject to be announced later.

The Boston Section will give its Annual Dinner, at the City Club.

April 4: The Detroit Section will hold a joint meeting with the Detroit Engineering Society, in the auditorium of the Board of Commerce. William B. Stout, Chief Engineer of the United Aircraft Engineering Corporation, will speak on Commercialization of Aircraft.

April 7: The Minnesota Section will hold its regular meeting at the St. Paul Association of Commerce.

April 9: At Johns Hopkins University, as one of the series of Aldred lectures, H. S. Slocum, Consulting Engineer, of New York City, will speak on The Duties of the Young Engineer on the Construction of a Hydroelectric Plant.

The New York Section and the Metropolis Section of the S. A. E. will hold a symposium on the general subject of Heavy-Oil Engines.

April 18: The St. Louis Section will hold a meeting at the Hotel Statler, subject and speaker to be announced later.

April 22: The Philadelphia Section will hold its monthly meeting at the Engineers' Club, the feature being a topical discussion on the subject of Fuel and Power Conservation.

April 28: At 8 o'clock, in the Chamber of Commerce Hall, Meriden, Conn., Joseph F. Keller, Mem., Am.Soc.M.E., General Manager of the Keller Mechanical Engraving Company, will give an illustrated lecture on The Machine Making of Dies.

April 30: At Johns Hopkins University, as one of the series of Aldred lectures, P. H. Falter, Shawinigan Electro Products Company, Baltimore, will speak on The Production of 50 Per Cent Ferrosilicon in the Electric Furnace.

JOINT MEETING OF STUDENT BRANCHES

Saturday, April 12: The Annual Joint Meeting of Student Branches will be held at the Engineering Societies Building. The program will include an afternoon meeting starting about 4:00 p.m., at which several addresses will be made by prominent speakers, followed by a supper and a general "get together" meeting in the evening. Committees from the metropolitan colleges are working diligently to make the meeting a success, and look for the cooperation of other colleges.

SOCIETY AFFAIRS

Affairs of Interest to the Membership—Council Notes—Directory of Council and Committees for 1919—Meetings of Local Sections—Employment Bulletin—Candidates for Membership

An Impression of the President

SOME two years ago the Electricals held a meeting somewhere at which their then President spoke not only to those present, but also, by a telephonic arrangement, simultaneously to gatherings of the Institute's local sections all over the country. It is too bad that this arrangement has not yet been commercialized and extended so that every member of such tremendous organizations as the Electricals, ours and others, spread over such wide territory, could hear the voices of their officers and get the inspiration and incentive.

President Cooley, for example, is a lovable man and goes right straight to the heart of any one within reach of his voice. We attended a meeting of the Connecticut Section with him on March 19, and he disclosed his methods of holding down the chief office in the Society in so frank a manner that, although his audience was "East of the Alleghanies," any former Westerners present, who might have retained the kind of ideas that a Westerner is supposed to harbor on how a Society which happens to conduct its general offices "down East" is run, could not help but get disillusioned.

Two good points the President made—the first that we have gone a long way in the engineering profession since the time when there were a couple of mechanical engineers in, say, the state of Michigan and about half a dozen civils, and similarly the Society has gone a long way since the time when all its members could get to all the meetings and every one have something to say in discussion. Now we have an organization, a "whale of an organization," and he was frank to confess that he mounted into the Presidential chair with the great ambition of writing his name up high on the Hall of Fame; then he got to work on finding the place to make his dent, and, after three and a half months of studying the way the Society does things through its marvelous committee organization, he had just about arrived at the conclusion that if he could hold down the presidential job satisfactorily and leave something for the next man who came along he would have done all that could be expected of him.

His second point was his favorite contention, which he has endeavored to make for many years, but, as he says, with little progress. That is that there is "an unoccupied rung in the engineer's ladder of fame." Engineers are a group of specialists. They know a lot of things, but they keep them to themselves. They might do otherwise with much better results. For instance, they might, without doing any organized propaganda work, teach their next-door neighbors a little arithmetic about public-utility properties, and in this way they might gradually influence public opinion. The public does not know what the engineers know and could tell them, but for their attitude of keeping their knowledge to themselves; and until the public does know, there will never be engineers in legislative bodies, in Congress, in state legislatures, in utilities commissions, and so forth. The President urged his audience to "roll this idea around in their minds a little."

President Cooley still keeps up the practice of coming down to headquarters a few days before Council meetings to go over things, and at the present time there is not a man more interested in the work of the organization than is he. He tells us frankly that for the size and kind of organization we have, our potentialities are enormous and many of our resources are as yet entirely undeveloped. But he advises going slowly—better, he says, to have a few things that we can do well than get into everything. And this thought he is passing along to the Committee on Aims and Organization, which he expects will tell us at the Spring Meeting in Detroit just which are the things we can profitably decide on to do and do them with all our might.

No impression of the Dean, however brief, would be correct, though, without a reference to his keen sense of humor—he has a good story for every occasion, including state affairs, and his infectious smile, together with his rapid-fire sizing-up of both the brighter side as well as the more serious side of the situation, has endeared him to the hearts of all in the Society who have had the privilege of meeting and working with him.

W. E. B.

Participation in Public Affairs

Too much cannot be said in commendation of the splendid participation by many of the local engineering societies in public affairs.

In St. Louis, in connection with the $23,000,000 bond issue, most of which has to do with engineering projects; in Cleveland, the straightening out of the Cuyahoga River and the construction of a new bridge in the heart of the city; in Los Angeles, the flood control in Los Angeles County. These examples might be extended, but sufficient is indicated to show the engineer-citizen is assuming his part in government. Let the good work proceed.

There is no community, no matter how small, in which the engineer will not find some civic problem requiring technical ability for its solution. It therefore becomes the duty of the local engineering society in every place to assume the initiative and, as a matter of course, take up at its meetings the presentation of the engineering features of every civic matter.

For the broad consideration of every phase of the subject, all engineers, chemists and architects should obviously be on the board of the local society. The local societies in turn should strive to constitute themselves the technical committee of their respective chambers of commerce, merchants' associations or other recognized civic bodies.

Where matters pertain to national improvements, then the Engineering Council is the natural body through which all engineering organizations, national and local, may work.

CALVIN W. RICE.

Council Meeting in Pittsburgh

THE Council of The American Society of Mechanical Engineers spent Washington's Birthday at Pittsburgh, Pa., where they visited Past-President John Brashear's workshop in the morning, lunched at the Duquesne Club, held their regular business meeting in the rooms of the Engineers' Society of Western Pennsylvania in the afternoon, and met the officers of the Engineers' Society of Western Pennsylvania and the members of the A. S. M. E. in the Pittsburgh district at dinner at the William Penn Hotel in the evening.

As was anticipated, the visit to "Uncle John's" place in the morning was a delightful one. The party was taken out in automobiles to his shop on the north side, and spent about two hours and a half there, and later visited him at his house, to which he was unfortunately confined by a slight indisposition.

At the business meeting in the afternoon, the following were present:

M. E. Cooley, *President*, presiding. Past-Presidents John A. Brashear, Ira N. Hollis, Chas. T. Main; Vice-Presidents Spencer Miller, John Hunter, John A. Stevens. Managers Robert H. Fernald, Wm. B. Gregory, Chas. L. Newcomb, Chas. Russ Richards, Frank O. Wells, and D. Robert Yarnall. Committee Chairmen W. E. Symons, *Finance*, George A. Orrok, *Publication and Papers*, S. D. Collett, *Membership*, and Calvin W. Rice, *Secretary;* also, by invitation, L. C. Marburg, *Chairman Committee on Aims and Organization.*

The following is a brief account of the business transacted.

Meetings and Program Committee. The President announced the appointment of Walter Rautenstrauch for one year and R. V. Wright for five years.

The status of the Sub-Committee on Industrial Buildings was changed to that of a special committee.

The date of the Spring Meeting in Detroit was changed to Monday, June 16, to Thursday, June 19; the business session to be held on Monday.

Membership. Under this department the Secretary reported deaths in the membership covering the last three months.

Mr. Collett, *Chairman*, reported that the work of his committee was now well up to date and the committee was considering some revision of the Society's policy regarding membership which would be referred to the Committee on Aims and Organization in due course.

The suggestion of Mr. Collett was most cordially received and provided for in a general resolution and recommendation to the Aims and Organization Committee, reported later.

Constitution and By-Laws Committee. The President reported the appointment of E. S. Carman as the fifth member of the committee.

Local Sections Committee. Report and recommendations on the "Cleveland Plan" for joint membership in the Cleveland Engineering Society and our Society were received and adopted.

A petition from members of the Society in Tulsa, Okla., for the formation of the Mid-Continent Section was approved.

Requests for professional sections were referred to the Executive Committee with power.

Research Committee. The appointment of George A. Orrok, *Chairman*, Prof. A. J. Wood, Dr. Harvey N. Davis, Dr. Edgar Buckingham, and A. D. Pratt, as Sub-committee on Heat Transmission, was approved.

Boiler Code Committee. Interpretations covering cases Nos. 208 to 214, inclusive, were approved with slight modifications and ordered published in MECHANICAL ENGINEERING.

Gage Committee. Having fulfilled its task, the committee was discharged with thanks.

Student and Junior Prizes, etc. The Committee on Student Branches and related committees were merged into a committee to be designated Relations with Colleges, and this committee was requested to investigate and report on the suitability and feasibility of an Award of Merit to be established by the Society.

Engineering Delegation to France. Past-President Main presented a written report of the engineering delegation to France, which was received and the sincere appreciation of the Council recorded. The report will be published in MECHANICAL ENGINEERING.

Mr. Main reported that a delegation of French engineers is to visit the United States in the next month or so and recommended that the Society join with others in a welcome to his delegation.

Ottawa Meeting, Engineering Institute of Canada. Dr. Hollis reported on his most enthusiastic reception as the representative of the Society on the occasion of the international meeting, February 11, 12 and 13, of the Engineering Institute of Canada.

National Research Council. Arthur M. Greene, Jr., *Chairman* of the Research Committee of the Society, was appointed as the representative on the Research Council, which is to be reorganized on a "peace basis."

Appointments by the President. The President announced the appointment of O. R. De Lamarter and H. T. Abrams to represent the Society at the annual meeting of the American Institute of Mining Engineers; and of C. H. Benjamin and E. L. Ohle for similar representation at the annual convention of the National Society for Vocational Education.

Nominating Committee. The provision of By-Law B27 regarding dates of announcements of and meeting of the regular Nominating Committee was suspended this year, as these dates conflict with the date of the Spring Meeting. The President stated that the committee would, however, report at the Spring Meeting.

Adjournment was taken to meet in New York.

CALVIN W. RICE,
Secretary.

SUCCESSFUL DINNER AT THE WILLIAM PENN

About ninety were present at the dinner in the evening, which was held in the blue room of the William Penn Hotel. Mr. Sumner B. Ely, member of the Committee on Local Sections and member of the Committee on Aims and Organizations, acted as toastmaster; and the speakers of the evening were Dr. Brashear, President Cooley, Mr. George H. Danforth, Vice-President of the Engineers' Society of Western Pennsylvania, and Mr. Calvin W. Rice, Secretary. The following members of the Board of Direction of the Engineers' Society of Western Pennsylvania were present as invited guests: Past-President J. O. Handy, A. L. Hoerr, G. H. Danforth, A. Stucki, R. Khuen and K. F. Treschow, Secretary. The keynote of the gathering was, Coöperation for the Advancement of the Engineering Profession.

The thanks of the Society are due to the Committee on Arrangements, S. B. Ely, *Chairman*, Morris Knowles, H. R. Cornelius, C. W. Bennett, Kenneth Seaver, and to Mr. K. F. Treschow, who arranged for the use of the Western Society's rooms.

Past-President Warner Goes to Europe

Mr. Worcester R. Warner, Past-President of the Society, sailed for Europe on the *Aquitania* on March 6 as a member of a delegation of the Cleveland Chamber of Commerce visiting England, France and Italy, in the interests of American industry. Mr. E. S. Carman, member of the Committee on Constitution and By-Laws and Chairman of the Cleveland Local Section, was also in the party.

Mr. Warner was charged by the Council at its Pittsburgh meeting with the mission of ascertaining the sentiment on the other side regarding a prospective joint meeting of American and foreign engineers, either here or abroad, in the near future; and to place at his disposal the ideas of some of the Council members and of a few friends of the Society who have been over recently, an informal luncheon was given to Mr. Warner at the Engineers' Club in New York two days before his sailing.

There were present at this luncheon Past-President James Hartness; Treasurer William H. Wiley; Vice-Presidents Henry B. Sargent, Spencer Miller and Fred R. Low; Messrs. W. E. Symons, George A. Orrok, S. D. Collett and Jesse M. Smith, also members of the Council; Messrs. W. W. Macon, A. J. Baldwin and H. L. Aldrich, members of a delegation of technical editors that went to Europe last December at the invitation of the British Government; also Mr. Carman.

Mr. Low presided. At the close of luncheon each of those present expressed his good wishes to Mr. Warner for a safe trip.

Junior and Student Prizes

Junior members of the Society and enrolled members of student branches will be interested in the annual competitions for prizes for technical papers conducted by the Society. An award is made every year for the best paper by a Junior Member, and two similar awards for the two best papers by enrolled members of student branches.

The awards consist of cash prizes, the Junior prize amounting to about fifty dollars and the Student prizes to about twenty-five dollars each, and engraved certificates. Papers awarded prizes are considered by the Meetings and Publication Committees of the Society for presentation at the meetings and for inclusion in the publications.

Prizes are awarded for the best papers adjudged from the standpoints of originality of matter, applicability (practical or theoretical), value as a contribution to technical literature, logical development of contents, conclusiveness, completeness and conciseness. These specifications, besides furnishing the examining committees with a definite basis upon which to rate the papers submitted, will also serve to assist competitors in the preparation of their manuscripts.

The rules covering the awards are given in the Year Book of the Society. The last date for submitting papers for consideration by the Committees on Awards this year is June 30. Any further information will be gladly furnished by the Secretary.

DIRECTORY OF COUNCIL AND COMMITTEES, 1919

WITH the rapid increase in the membership of the Society and the corresponding development in number and variety of activities, the committee organization of the Society, by means of which these activities are administered under the direction of the Council, becomes a pretentious one.

The scheme of this organization is described in the general information section of the 1919 Year Book, and a classified list of the committees, giving their titles and sub-titles, describing their scope and also listing their personnel, is included in the same volume.

An idea of the magnitude of the committee work, which now necessitates a total of 655 appointments, will be obtained from a consideration of the following list of members and their assignments:

Name	Committee
Aborn, Geo. P., East Cambridge, Mass.	*Boston Section*
Adams, E. T., Syracuse, N. Y.	*Gas and Oil Engines, Power Tests, s.*
Adams, Edward T., San Francisco, Cal.	*Main Com. Power Test Codes*
Ahara, E. H., Mishawaka, Ind.	*Steel Roller Chains*
Ahara, G. V., Toronto, Canada	*Ontario Section*
Alexander, M. W., Boston, Mass.	*Industrial Relations*
Alexander, M. W., Boston, Mass.	*Protection of Industrial Workers*
Alford, Leon P., New York City	(c) *Cutting Action Machine Tools*
Alford, Leon P., New York City	*Machine Tool Standardization*
Alford, Leon P., New York City	*Aims and Organization*
Alverson, H. V., Buffalo, N. Y.	(c) *Buffalo Section*
Anderson, Chas. H., Cincinnati, O.	*Displacement Pumps, Power Test, s.*
Andrew, J. D., Philadelphia, Pa.	*Gen'l Inst. Power Test, s.*
Angus, Robert W., Toronto, Canada	*Aims and Organization*
Angus, Robert W., Toronto, Canada	(c) *Ontario Section*
Ashton, A. C., Cambridge, Mass.	*Boston Section*
Auel, Carl B., E. Pittsburgh, Pa.	*Protection of Industrial Workers*
Azbe, Victor J., St. Louis, Mo.	*Feedwater Heater Standardization*
Bailey, A. D., Chicago, Ill.	*Boilers, Power Test, s.*
Bailey, E. G., Boston, Mass.	*Feeds, Power Test, s.*
Bailey, F. W., Buffalo, N. Y.	*Buffalo Section*
Baker, A. J., Cincinnati, O.	*Machine Shop Practice, Meeting, s.*
Baker, Chas. H., Worcester, Mass.	*Condenser Units and Feed Water Heaters, Power Test, s.*
Baker, Charles Whiting, New York City	*Engineering Council*
Baldwin, A. J., New York City	*New York Section*
Baldwin, W. J., New York City	*International Standard for Pipe Threads*
Ballin, A. E., Auburn, N. Y.	*Gas and Oil Engines, Power Test, s.*
Bannister, John C., Kewanee, Ill.	*Revision of Briggs Standard*
Barelli, J. S., New Orleans, La.	*New Orleans Section*
Barney, E. E., New York City	*Cutting Action Machine Tools, Research, s.*
Barnum, Geo. S., New Haven, Conn.	*Textiles, Meetings, s.*
Barnum, S. H., 2d, New Haven, Conn.	*New Haven Branch, Conn.*
Barr, John H., New York City	*Protection of Industrial Workers*
Barr, John H., New York City	*Screw Thread Gages*
Barr, Kester, Buffalo, N. Y.	*Buffalo Section*
Barrows, Lee E., Fort Worth, Tex.	*Fuel Oil, Research*
Barrus, George H., Boston, Mass.	*Main Com. Power Test Codes*
Barrus, George H., Boston, Mass.	*Gen'l Inst. Power Test, s.*
Barrus, George H., Boston, Mass.	*Steam Eng's. Power Test, s.*
Barrus, George H., Boston, Mass.	*Kent Memorial*
Bartlett, G. M., Indianapolis, Ind.	*Steel Roller Chains*
Basford, George M., New York City	*Locomotives, Power Test, s.*
Basford, George M., New York City	*Railroads, Meetings, s.*
Basford, George M., New York City	*Constitution and By-Laws*
Batchelder, B. C., Brooklyn, N. Y.	*Air Machinery, Meetings, s.*
Baylis, Arthur R., New York City	(c) *Flanges and Pipe Fittings*
Beck, M. A., Milwaukee, Wis.	*Milwaukee Section*
Beers, F. L., New York City	*Technical Nomenclature*
Benet, Laurence V., Paris, France.	*International Cor. Com. on Screw Threads*
Benet, Laurence V., Paris, France.	*International Standard for Pipe Threads*
Benjamin, Charles H., Lafayette, Ind.	(c) *Steel Roller Chains*
Benjamin, Charles H., Lafayette, Ind.	(c) *Rehabilitation of Blind Soldiers*
Bentley, Oliver D. H., Hyde Park, Mass.	*Displ. Compressors and Blowers, Power Test, s.*
Bentley, Oliver D. H., Hyde Park, Mass.	*Main Com. Power Test Code*
Best, W. N., New York City	*Boilers, Power Test, s.*
Best, W. N., New York City	*Engrng. Soc. Library*
Bierbaum, Christopher H., Buffalo, N. Y.	(c) *Bearing Metals, Research, s*
Bierbaum, Christopher H., Buffalo, N. Y.	*Aims and Organization*
Billings, J. H., Toronto, Canada	*Ontario Section*
Bird, William W., Worcester, Mass.	*Technical Literature*
Bird, William W., Worcester, Mass.	(c) *Foundry Practice, Meetings, s.*
Bixler, H. Z., Youngstown, O.	*Cleveland Section*
Blake, Charles S., Hartford, Conn.	(c) *Hartford Branch, Conn.*
Blake, Charles S., Hartford, Conn.	*Connecticut Section*
Block, Louis, New York City	*Refrig. Machines and Plants, Power Test, s.*
Boehm, William H., New York City	*Boiler Code*
Bond, G. M., Hartford, Conn.	*International Standard for Pipe Threads*
Boyd, W. W., Buffalo, N. Y.	*Buffalo Section*
Brashear, John A., Pittsburgh, Pa.	*Council*
Brashear, John A., Pittsburgh, Pa.	*Advancement of Science*
Brashear, John A., Pittsburgh, Pa.	*John Fritz Medal Board*
Brashear, John A., Pittsburgh, Pa.	*Holmes Memorial*
Breckenridge, L. P., New Haven, Conn.	*Aims and Organization*
Breckenridge, L. P., New Haven, Conn.	*Fuels, Power Test, s.*
Breckenridge, L. P., New Haven, Conn.	*Technical Literature*
Breckenridge, L. P., New Haven, Conn.	*Main Com. Power Test Codes*
Brewer, Arthur, Bridgeport, Conn.	*Bridgeport Branch, Conn.*
Brink, H. LeRoy, St. Paul, Minn.	*Minnesota Section*
Brinton, W. C., New York City,	(c) *Joint Comm. of Standards for Graphic Presentation*
Brinton, W. C., New York City	*New York Section*
Brossman, Charles, Indianapolis, Ind.	*Indianapolis Section*
Brown, E. H., Milwaukee, Wis.	*Displacement Pumps, Power Test, s.*
Brown, W. C., Syracuse, N. Y.	*Main Com. Power Test Code*
Brown, W. C., Syracuse, N. Y.	*Centrif. Pumps, Power Test, s.*
Brown, W. C., Syracuse, N. Y.	*Steam Eng's. Power Test, s.*
Brown, Willard, Cleveland, O.	*Cleveland Section*
Brush, Charles F., Cleveland, O.	*Western Society of Engineers, Washington Award*
Buckingham, Edgar, Rome, Italy	*Heat Transmission, Research, s.*
Bullard, E. P., Jr., Bridgeport, Conn.	*Machine Shop Practice, Meetings, s.*
Bump, B. N., Syracuse, N. Y.	*Evaporating Apparatus, Power Test, s.*
Burchard, A. W., New York City	(c) *Industrial Relations*
Burdick, E. J., Detroit, Mich.	*Detroit Section*
Burdsall, Ellwood, Port Chester, N. Y.	*Tolerances in Screw Thread Fits*
Burdsall, Ellwood, Port Chester, N. Y.	*Machine Screw Nuts*
Burlingame, Luther D., Providence, R. I.	(c) *Weights and Measures*
Burlingame, Luther D., Providence, R. I.	*Worm Gearing, Research, s.*
Burlingame, Luther D., Providence, R. I.	(c) *Tolerances in Screw Thread Fits*
Burlingame, Luther D., Providence, R. I.	*Machine Screw Nuts*
Burnham, Chas., Los Angeles, Cal.	*Los Angeles Section*
Burnham, H. A., Boston, Mass.	*Industrial Buildings*
Burwell, R. T., New Orleans, La.	*New Orleans Section*
Bushnell, Fred N., Boston, Mass.	*Manager*
Caine, W. P., Ensley, Ala.	(c) *Birmingham Section*
Capp, John A., Schenectady, N. Y.	*Bearing Metals, Research, s.*
Carle, Nathaniel A., Newark, N. J.	*Main Com. Power Test Codes*
Carle, Nathaniel A., Newark, N. J.	*Complete Steam Power Plants, Power Test, s.*
Carman, E. S., Cleveland, O.	(c) *Cleveland Section*
Carman, E. S., Cleveland, O.	*Aims and Organization*
Carman, E. S., Cleveland, O.	*Constitution and By-Laws*
Carr, E. W., Jr., New Orleans, La.	*New Orleans Section*
Cary, A. A., New York City	*Boilers, Power Test, s.*
Cautley, J. R., New Brunswick, N. J.	*Steel Roller Chains*
Chapman, C. M., New York City	(c) *Standardization of Shafting*
Chapman, Wm. B., New York City	*Gas Producers, Power Test, s.*
Chase, Frederick S., Waterbury, Conn.	*Waterbury Branch, Conn.*
Cheney, Charles, So. Manchester, Conn.	*Industrial Relations*
Christie, A. G., Baltimore, Md.	*Steam Engines Power Test, s.*
Christie, A. G., Baltimore, Md.	*Baltimore Section*
Christie, E. W., Sewaren, N. J.	*Condenser Units and Feed Water Heaters, Power Test; s.*
Church, M. D., Hartford, Conn.	*Hartford Branch, Conn.*
Clark, Frank H., Baltimore, Md.	*Boiler Code*
Clark, Frank H., Baltimore, Md.	*Railroads, Meetings, s.*
Coburn, Frederic G., Philadelphia, Pa.	*Tolerances in Screw Thread Fits*
Coffin, Grange S., Bridgeport, Conn.	*Fluid Meters, Research, s.*
Collamore, R., Detroit, Mich.	*Aims and Organization*
Collett, S. D., Hoboken, N. J.	(c) *Membership*
Collett, S. D., Hoboken, N. J.	*Council*
Collins, B. R. T., Boston, Mass.	*Complete Steam Power Plants, Power Test, s.*
Colvin, Fred H., New York City	*Tolerances in Screw Thread Fits*
Colvin, Fred H., New York City	*Machine Shop Practice, Meetings, s.*
Conrad, Hugh V., New York City.	*Displ. Compressors and Blowers, Power Test, s.*
Conrad, Hugh V., New York City	*Air Machinery, Meetings, s.*
Conrader, R., Erie, Pa.	*Erie Section*
Cooke, Harte, Auburn, N. Y.	*Steam Engines, Power Test, s.*
Cooke, Harte, Auburn, N. Y.	*Gas Power, Meetings, s.*
Cookson, T. J., Cincinnati, O.	*Feedwater Heater Standardization*
Cooley, Mortimer E., Ann Arbor, Mich.	*President*
Cooley, Mortimer E., Ann Arbor, Mich.	(c) *Exec. Com. Council*
Cooley, Mortimer E., Ann Arbor, Mich.	*Engineering Council*
Coulter, J., Bridgeport, Conn.	*Bridgeport Branch, Conn.*
Crane, H. M., New Brunswick, N. J.	*Gas Power, Meetings, s.*
Crawford, D. F., Pittsburgh, Pa.	*Small Hose Couplings*

For Classified List of Committees see 1919 Year Book.
(c) denotes chairman; s, subcommittee (individual committee for Power Test Codes).

Name — Committee

CROSBY, W. W., Boston, Mass. — *Boston Section*
CUMMINGS, BYRON, New York City — *Protection of Industrial Workers*
CUMMINGS, ORRIE P., New York City — (c) *House*
CUTLER, F. G., Ensley, Ala. — *Centrif. and Turbo-Compressors, Power Test,* s.
DALTON, WILLIAM, Washington, D. C. — *Industrial Buildings*
DANFORTH, RAYMOND H., Cleveland, O. — *Fuel Oil Research,* s.
DARLING, ALBERT W., Worcester, Mass. — *Worcester Section*
DART, W. C., Providence, R. I. — *Small Hose Couplings*
DAVIS, HARVEY N., Cambridge, Mass. — *Heat Transmission, Research,* s.
DAY, C. H., Cleveland, O. — *Cleveland Section*
DAY, CHARLES, Philadelphia, Pa. — *Industrial Buildings*
DEAN, FRANCIS W., Philadelphia, Pa. — *Boiler Code*
DEBAUFRE, WILLIAM L., Annapolis, Md. — *Baltimore Section*
DECHERD, C. K., Meriden, Conn. — (c) *Meriden Branch, Conn.*
DECHERD, C. K., Meriden, Conn. — *Connecticut Section*
DECROW, D. A., Harrison, N. J. — *Displacement Pumps, Power Test,* s.
DELEEUW, A. L., Elizabethport, N. J. — (c) *Machine Tool Standardization*
DELEEUW, A. L., Elizabethport, N. J. — *Weights and Measures*
DE LEEUW, A. L., Elizabethport, N. J. — *Cutting Action Mch. Tools, Research,* s.
DELEEUW, A. L., Elizabethport, N. J. — *Meetings and Program*
DELEEUW, A. L., Elizabethport, N. J. — *Machine Shop Practice, Meetings,* s.
DEWOLF, J. O., Boston, Mass. — *Industrial Buildings*
DICKINSON, H. C., Washington, D. C. — *Gas Power, Meetings,* s.
DIEDERICHS, HERMAN, Ithaca, N. Y. — *Steam Eng'g. Power Test,* s.
DIEDERICHS, HERMAN, Ithaca, N. Y. — *Bearing Metals, Research,* s.
DISERENS, PAUL, Cincinnati, O. — *Disp. Compressors and Blowers, Power Test,* s.
DODGE, A. R., Schenectady, N. Y. — *Complete Steam Power Plants, Power Test,* s.
DORNER, F. H., Milwaukee, Wis. — *Milwaukee Section*
DOW, ALEX, Detroit, Mich. — *Finance*
DUNCAN, ALBERT G., Boston, Mass. — *Aims and Organization*
DUNCAN, ALBERT G., Boston, Mass. — *Textiles, Meetings,* s.
DURBAN, THOMAS E., Erie, Pa. — *Boiler Code*
EALES, WM. P., Hartford, Conn. — *Protection of Industrial Workers*
EBERHARDT, HENRY J., Newark, N. J. — *Machine Shop Practice, Meetings,* s.
EGBERT, H. D., New York City — *New York Section*
EHRHART, R. N., Pittsburgh, Pa. — *Condenser Units and Feed Water Heaters, Power Tests,* s.
EHRMAN, EDWIN H., Chicago, Ill. — (c) *Machine Screw Nuts*
EHRMAN, EDWIN H., Chicago, Ill. — *Screw Threads and Threaded Parts*
EHRMAN, EDWIN H., Chicago, Ill. — *International Corr. Com. on Screw Threads*
EHRMAN, EDWIN H., Chicago, Ill. — *Nat. Screw Thread Com.*
ELY, S. B., Pittsburgh, Pa. — *Aims and Organization*
ELY, S. B., Pittsburgh, Pa. — *Local Sections*
EMMET, W. L. R., Schenectady, N. Y. — *Naval Consulting Board*
EMSWILER, J. E., Ann Arbor, Mich. — *Centrif. and Turbo Compressors, Power Test,* s.
ENNIS, W. D., New York City — (c) *Technical Nomenclature*
ESSELSTYN, H. H., Detroit, Mich. — *Publication and Papers*
EVANS, GEO. B., St. Louis, Mo. — *St. Louis Section*
EVELETH, C. E., Schenectady, N. Y. — *Railroads, Meetings,* s.
FAIG, J. T., Cincinnati, O. — *Aims and Organization*
FAIG, J. T., Cincinnati, O. — *Cincinnati Section*
FAIR, CHARLES, Schenectady, N. Y. — *Machine Shop Practice, Meetings,* s.
FAIRFIELD, H. P., Worcester, Mass. — *Machine Shop Practice, Meetings,* s.
FAIRFIELD, H. P., Worcester, Mass. — *Worcester Section*
FAIRFIELD, H. P., Worcester, Mass. — *Aims and Organization*
FERNALD, ROBERT H., Philadelphia, Pa. — *Main Com. Power Test Codes*
FERNALD, ROBERT H., Philadelphia, Pa. — *Gas Producers, Power Test,* s.
FERNALD, ROBERT H., Philadelphia, Pa. — *Manager*
FISCHER, FRED J., Los Angeles, Cal. — *Los Angeles Section*
FISH, CHARLES H., Boston, Mass. — *Textiles, Meetings,* s.
FISH, EDWARD R., Phœnixville, Pa. — *Boiler Code*
FISH, EDWARD R., Phœnixville, Pa. — *Main. Com. Power Test Codes*
FISH, EDWARD R., Phœnixville, Pa. — *Boilers, Power Test,* s.
FISHER, E. C., Saginaw, Mich. — *Boiler Code*
FISHER, E. C., Saginaw, Mich. — (c) *Detroit Section*
FISHER, SIDNEY, Bridgeport, Conn. — *Fluid Meters, Research,* s.
FLAGG, C. N., JR., Meriden, Conn. — *Meriden Branch, Conn.*
FLAGG, STANLEY G., JR., Philadelphia, Pa. — *Foundry Practice, Meetings,* s.
FLAGG, STANLEY G., JR., Philadelphia, Pa. — *Revision of Briggs Standard*
FLAGG, STANLEY G., JR., Philadelphia, Pa. — *Screw Threads and Threaded Parts*
FLAGG, STANLEY G., JR., Philadelphia, Pa. — *Flanges and Pipe Fittings*
FLAGG, STANLEY G., JR., Philadelphia, Pa. — *International Standard for Pipe Threads*
FLANDERS, RALPH E., Springfield, Vt. — *International Cor. Com. on Screw Threads*
FLANDERS, RALPH E., Springfield, Vt. — *Publication and Papers*
FLANDERS, RALPH E., Springfield, Vt. — *Machine Shop Practice, Meetings,* s.
FLATHER, J. J., Minneapolis, Minn. — *Steel Roller Chains*
FLETCHER, E. L., Bridgeport, Conn. — *Connecticut Section*
FLETCHER, E. L., Bridgeport, Conn. — (c) *Bridgeport Branch, Conn.*
FLOWERS, ALAN E., Washington, D. C. — *Lubrication, Research,* s.
FORAN, GEORGE J., New York City — *Engineering Council*
FORAN, GEORGE J., New York City — *Publication and Papers*
FORAN, GEORGE J., New York City — *Displacement Pumps, Power Test,* s.

Name — Committee

FORAN, GEORGE J., New York City. — *Condenser Units and Feed Water Heaters, Power Test,* s.
FORAN, GEORGE J., New York City — *Main Com. Power Test Code*
FORREST, GEORGE M., New York City — *Finance*
FORSTALL, ALFRED E., New York City — *Finance*
FORSTALL, ALFRED E., New York City — *Technical Literature*
FOSDICK, FREDERICK, Fitchburg, Mass. — *Worcester Section*
FREEMAN, JOHN R., Providence, R. I. — *John Fritz Medal Board*
FRENCH, L. G., New York City — *Technical Nomenclature*
FROST, E. J., Jackson, Mich. — *Detroit Section*
FULLER, ARTHUR A., Providence, R. I. — *Tolerances in Screw Thread Fits*
FULLER, BENJ. D., Cleveland, O. — *Foundry Practice, Meetings,* s.
GALBRAITH, GEO. W., Cincinnati, O. — (c) *Cincinnati Section*
GANTT, H. L., New York City — *Kent Memorial*
GASSMAN, H. M., Birmingham, Ala. — *Birmingham Section*
GASSMAN, H. M., Birmingham, Ala. — *Aims and Organization*
GEBHARDT, G. F., Chicago, Ill. — (c) *Feedwater Heater Standardization*
GEIER, FRED A., Cincinnati, O. — *Manager*
GIBBS, A. W., Philadelphia, Pa. — *Locomotives, Power Test,* s.
GIFFORD, A. J. Worcester, Mass. — *Machine Shop Practice, Meetings,* s.
GORTON, CHAS. E., New York City — *Boiler Code*
GOSS, W. F. M., New York City — *John Fritz Medal Board*
GOSS, W. F. M., New York City — *Locomotives, Power Test,* s.
GOSS, W. F. M., New York City — *Gen'l Inst. Power Test,* s.
GOSS, W. F. M., New York City — *Main Com. Power Test Codes*
GOSS, W. F. M., New York City — *Aims and Organization*
GOSS, W. F. M., New York City — *Railroads, Meetings,* s.
GOSS, W. F. M., New York City — *Engineering Foundation*
GREENE, ARTHUR M., JR., Troy, N. Y. — (c) *Research*
GREENE, ARTHUR M., JR., Troy, N. Y. — *Boiler Code*
GREENE, ARTHUR M., JR., Troy, N. Y. — *U. S. Bureau of Mines, Advisory Committee*
GREENE, ARTHUR M., JR., Troy, N. Y. — *Gen'l Inst. Power Test,* s.
GREENE, ARTHUR M., JR., Troy, N. Y. — *Natl. Research Council*
GREENE, EDWIN F., Boston, Mass. — *Textiles, Meetings,* s.
GREGG, ROBERT, Atlanta, Ga. — (c) *Atlanta Section*
GREGORY, W. B., New Orleans, La. — *Manager*
GREGORY, W. B., New Orleans, La. — *Advancement of Science*
GREGORY, W. B., New Orleans, La. — *Centrif. Pumps, Power Test,* s.
GROHMANN, C. L., Hartford, Conn. — *Hartford Branch, Conn.*
GUSTAFSON, LEWIS, St. Louis, Mo. — (c) *St. Louis Section*
GUSTAFSON, LEWIS, St. Louis, Mo. — *Aims and Organization*
HAGEN, H. F., Hyde Park, Mass. — *Centrif. and Turbo Compressors, Power Test,* s.
HAIGHT, L. V., Sherbrooke, Can. — *Machine Tool Standardization*
HALSEY, FREDERICK A., New York City — *Air Machinery, Meetings,* s.
HALSEY, FREDERICK A., New York City — *Weights and Measures*
HALSEY, FREDERICK A., New York City — (c) *Worm Gearing, Research,* s.
HAMILTON, C. B., Toronto, Canada — *Ontario Section*
HAMILTON, DOUGLAS T., Springfield, Vt. — *Machine Shop Practice, Meetings,* s.
HAMMOND, RICHARD, Buffalo, N. Y. — *Boiler Code*
HANLEY, W. A., Indianapolis, Ind. — *Indianapolis Section*
HANSEN, CARL M., Huntington, Pa. — *Protection of Industrial Workers*
HANSON, B. M. W., Hartford, Conn. — *Hartford Branch, Conn.*
HARPER, JOHN L., Niagara Falls, N. Y. — *Water Wheel Code, Power Test,* s.
HARRIS, HARRY E., Bridgeport, Conn. — (c) *Screw Thread Gages*
HARRINGTON, JOSEPH, Riverside, Ill. — *Feedwater Heater Standardization*
HARTNESS, JAMES, Springfield, Vt. — *Screw Threads and Threaded Parts*
HARTNESS, JAMES, Springfield, Vt. — *Aims and Organization*
HARTNESS, JAMES, Springfield, Vt. — *Council*
HARTNESS, JAMES, Springfield, Vt. — *Tolerances in Screw Thread Fits*
HARTNESS, JAMES, Springfield, Vt. — *Nat. Screw Thread Com.*
HARTSHORNE, WM. D., Methuen, Mass. — *Textiles, Meetings,* s.
HEALD, J. N., Worcester, Mass. — *Machine Shop Practice, Meetings,* s.
HECHLER, FRED G., Annapolis, Md. — *Fluid Meters, Research,* s.
HENDERSON, GEORGE R., Philadelphia, Pa. — *Locomotives, Power Test,* s.
HENDERSON, GEORGE R., Philadelphia, Pa. — *Main Com Power Test Code*
HENNING, J. L., New Orleans, La. — *Aims and Organization*
HERR, E. M., East Pittsburgh, Pa. — (c) *Corresponding Com. on Screw Threads*
HERR, E. M., East Pittsburgh, Pa. — *Flanges and Pipe Fittings*
HERR, E. M., East Pittsburgh, Pa. — *Weights and Measures*
HERR, E. M., East Pittsburgh, Pa. — (c) *Revision of Briggs Standard*
HERR, E. M., East Pittsburgh, Pa. — (c) *International Standard for Pipe Threads*
HERR, E. M., East Pittsburgh, Pa. — (c) *Screw Threads and Threaded Parts*
HERR, HERBERT T., E. Pittsburgh, Pa. — *Nat. Screw Thread Commission*
HERRON, J. H., Cleveland, O. — *Cleveland Section*
HERSEY, MAYO D., Washington, D. C. — *Lubrication, Research,* s.
HESS, HENRY, Philadelphia, Pa. — *American Engineering Standards*
HESS, HENRY, Philadelphia, Pa. — (c) *Standardization*
HETZEL, F. V., Indianapolis, Ind. — *Steel Roller Chains*
HILLER, N. H., Carbondale, Pa. — *Refrig. Machines and Plants, Power Test,* s.
HINCHEY, H. J., Atlanta, Ga. — *Atlanta Section*
HIRSHFELD, C. F., Washington, D. C. — *Gen'l Inst. Power Test,* s.
HIRSHFELD, C. F., Washington, D. C. — *Complete Steam Power Plants, Power Test,* s.
HIRSHFELD, C. F., Washington, D. C. — *Standardization*
HOBBS, FRANKLIN H., Boston, Mass. — *Textiles, Meetings,* s.

Name	Committee
HODGKINSON, FRANCIS, East Pittsburgh, Pa.	*Main Com. Power Test Codes*
HODGKINSON, FRANCIS, East Pittsburgh, Pa.	*Steam Turbines, Power Test,* s.
HOFFMAN, J. D., Lafayette, Ind.	*Rehabilitation of Blind Soldiers*
HOLLIS, IRA N., Worcester, Mass.	*Engineering Council*
HOLLIS, IRA N., Worcester, Mass.	*Exec. Com. of Council*
HOLLIS, IRA N., Worcester, Mass.	*Council*
HOLLIS, IRA N., Worcester, Mass.	*Student Branches*
HONISS, W. H., Hartford, Conn.	*Hartford Branch, Conn.*
HOOD, O. P., Washington, D. C.	*Air Machinery, Meetings,* s.
HOPPES, JOHN J., Springfield, O.	*Feedwater Heater Standardization*
HOPPS, J. H., San Francisco, Cal.	*San Francisco Section*
HOUSER, ARTHUR M., Chicago, Ill.	*Flanges and Pipe Fittings*
HOUSER, ARTHUR M., Chicago, Ill.	*Screw Threads and Threaded Parts*
HOWARD, FRANK E., Hartford, Conn.	*Hartford Branch, Conn.*
HUMPHREY, A. L., Wilmerding, Pa.	*Railroads, Meetings,* s.
HUMPHREY, A. L., Wilmerding, Pa.	*Boiler Code*
HUNT, ANDREW M., New York City	*Fuel Oil, Research,* s.
HUNT, ANDREW M., New York City	*Engrg. Soc. Library*
HUNT, ANDREW M., New York City	*Main Com. Power Test Codes*
HUNT, ANDREW M., New York City	*U. E. S. Library Board*
HUNTER, JOHN, New York City	*Exec. Com. Council*
HUNTER, JOHN, New York City	*Vice-President*
HURST, GEORGE L., San Francisco, Cal.	*San Francisco Section*
HUSTON, CHAS. L., Coatesville, Pa.	*Boiler Code*
HUTCHENS, EDW., Eau Claire, Wis.	*Milwaukee Section*
HUTCHINSON, J. A., Meriden, Conn.	*Meriden Branch, Conn.*
HUTTON, MANCIUS S., New York City	*Tellers of Election*
IDELL, FRANK E., New York City	*Feedwater Heater Standardization*
ISBELL, HOWARD L., Waterbury, Conn.	*Waterbury Branch, Conn.*
JACKSON, DUGALD C., Cambridge, Mass.	(c) *Cost of Electric Power*
JACKSON, J. P., Harrisburg, Pa.	*Protection of Industrial Workers*
JACOBUS, D. S., New York City	*Council*
JACOBUS, D. S., New York City	*Main Com. Power Test Codes*
JACOBUS, D. S., New York City	*Boilers, Power Test,* s.
JACOBUS, D. S., New York City	*Refrig. Machines and Plants, Power Test,* s.
JACOBUS, D. S., New York City	*Boiler Code*
JACOBUS, D. S., New York City	*Engineering Council*
JACOBUS, D. S., New York City	*Engineering Foundation*
JACOBUS, D. S., New York City	*Exec. Com. Council*
JACOBUS, R. F., Ridgefield, N. J.	*Membership*
JENKINS, A. L., Cincinnati, Ohio	*Cincinnati Section*
JENNINGS, EDWARD M., Boston, Mass.	*Boston Section*
JEPSON, GEORGE N., Worcester, Mass.	*Worcester Section*
JETER, S. F., Hartford, Conn.	*Hartford Branch, Conn.*
JETER, S. F., Hartford, Conn.	*Boiler Code*
JEWETT, A. C., New Haven, Conn.	*New Haven Branch, Conn.*
JOHNSON, A. E., Washington, D. C.	*Washington Section*
JONES, E. C., San Francisco, Cal.	(c) *San Francisco Section*
KANE, EDMUND J., Chicago, Ill.	*Gas Power, Meetings,* s.
KATTE, EDWIN B., New York City	(c) *Railroads, Meetings,* s.
KAVANAUGH, W. H., Philadelphia, Pa.	*Gen'l Inst. Power Test,* s.
KENERSON, W. H., Providence, R. I.	*Local Sections*
KENNEDY, JULIAN, Pittsburgh, Pa.	*Flanges and Pipe Fittings*
KENNEY, L. H., Philadelphia, Pa.	*Philadelphia Section*
KIESEL, WILLIAM F., JR., Altoona, Pa.	*Railroads, Meetings,* s.
KIESEL, WILLIAM F., JR., Altoona, Pa.	*Standardization*
KIESEL, WILLIAM F., JR., Altoona, Pa.	*Boiler Code*
KIESEL, WILLIAM F., JR., Altoona, Pa.	*American Engineering Standards*
KIMBALL, D. S., Ithaca, N. Y.	(c) *Meetings and Program*
KIMBALL, D. S., Ithaca, N. Y.	*Aims and Organization*
KIMBALL, D. S., Ithaca, N. Y.	*Machine Tool Standardization*
KIMBALL, D. S., Ithaca, N. Y.	*Council*
KINGSBURY, ALBERT, Pittsburgh, Pa.	(c) *Lubrication, Research,* s.
KINGSBURY, ALBERT, Pittsburgh, Pa.	*Research*
KINGSBURY, ALBERT, Pittsburgh, Pa.	*U. S. Bureau of Mines, Advisory Committee*
KINGSBURY, J. C., Bridgeport, Conn.	*Bridgeport Branch, Conn.*
KINKAID, T. W., Annapolis, Md.	*Def. and Values Power Test,* s.
KLINCK, J. H., Washington, D. C.	*Washington Section*
KNOEPPEL, CHAS. E., New York City	*Foundry Practice, Meetings,* s.
KRUESI, AUGUST H., Schenectady, N. Y.	*Cost of Electric Power*
LANGEN, GEORGE, Cincinnati, O.	*Machine Shop Practice, Meetings,* s.
LARNER, C. W., Philadelphia, Pa.	*Water Wheel Code, Power Test,* s.
LAUER, C. N., Philadelphia, Pa.	(c) *Philadelphia Section*
LAW, F. E., New York City	*Finance*
LAWRENCE, J. H., New York City	(c) *Tellers of Election*
LEE, CHARLES C., Bridgeport, Conn.	*Fluid Meters, Research,* s.
LEWIS, WILFRED, Philadelphia, Pa.	*Foundry Practice Meetings,* s.
LEWIS, WILFRED, Philadelphia, Pa.	*Machine Shop Practice, Meetings,* s.
LEWIS, WILFRED, Philadelphia, Pa.	*Worm Gearing, Research,* s.
LIEB, JOHN W., New York City	*U. E. S. Library Board*
LIEB, JOHN W., New York City	*Industrial Relations*
LOCKWOOD, E. H., New Haven, Conn.	*New Haven Branch, Conn.*
LOEB, LEO, Philadelphia, Pa.	*Fluid Meters, Research,* s.
LOEB, LEO, Philadelphia, Pa.	*Condenser Units and Feed Water Heaters, Power Test,* s.
LONDON, W. J. A., Springfield, Mass.	*Steam Turbines, Power Test,* s.
LONG, J. C., Cambridge, Mass.	*Small Hose Couplings*
LORD, C. E., Chicago, Ill.	*Aims and Organization*
LORD, C. E., Chicago, Ill.	(c) *Chicago Section*
LOW, FRED R., New York City	*Public Relations*
LOW, FRED R., New York City	*Boiler Code*
LOW, FRED R., New York City	*Aims and Organization*
LOW, FRED R., New York City	*Vice-President*
LOW, FRED R., New York City	*Definition and Values Power Test,* s.
LOW, FRED R., New York City	(c) *Main. Com. Power Test Code*
LOW, FRED R., New York City	*Kent Memorial*
LUCAS, H. M., Cleveland, O.	*Machine Shop Practice, Meetings,* s.
LUCKE, C. E., New York City	*Gas and Oil Engines, Power Test,* s.
LUDY, L. V., W. Lafayette, Ind.	*Aims and Organization*
LYON, JESSE D., Cincinnati, O.	*Feedwater Heater Standardization*
MCBRIDE, T. C., Philadelphia, Pa.	*Aims and Organization*
MCCABE, J. C., Detroit, Mich.	*Detroit Section*
MCFARLAND, WALTER M., New York City	*Engrng. Soc. Library*
MCFARLAND, WALTER M., New York City	*U. E. S. Board of Trustees*
MCGWIRE, CHAS. H., Los Angeles, Cal.	(c) *Los Angeles Section*
MACGILL, C. F., Bridgeport, Conn.	*Bridgeport Branch, Conn.*
MACGREGOR, W. F., Canton, O.	*Boiler Code*
MACMASTER, R. K., Elizabeth, N. J.	*Tellers of Election*
MACKINTOSH, F. L., New Haven, Conn.	*New Haven Branch, Conn.*
MACON, W. W., New York City	(c) *New York Section*
MAGRUDER, W. T., Columbus, O.	(c) *Gas Power, Meetings,* s.
MAGRUDER, W. T., Columbus, O.	*Gas Producers, Power Test,* s.
MAGUIRE, J. D., New York City	*House*
MAIN, CHARLES T., Boston, Mass.	*Exec. Com. of Council*
MAIN, CHARLES T., Boston, Mass.	*Industrial Buildings*
MAIN, CHARLES T., Boston, Mass.	*Council*
MANSS, W. H., Washington, D. C.	*Industrial Relations*
MARBURG, L. C., New York City	*Local Sections*
MARBURG, L. C., New York City	(c) *Aims and Organization*
MARKEY, H. S., San Francisco, Cal.	*San Francisco Section*
MARKS, LIONEL S., Cambridge, Mass.	*Standardization*
MARKS, LIONEL S., Cambridge, Mass.	*Def. and Values Power Test,* s.
MARQUART, E. J., Washington, D. C.	*Nat. Screw Thread Com.*
MARSHALL, S. M., New York City	*New York Section*
MARTENIS, J. V., Minneapolis, Minn.	*Minnesota Section*
MASON, F. H., Detroit, Mich.	*Detroit Section*
MATTHEWS, F. E., Leonia, N. J.	*Refrig. Machines and Plants, Power Test,* s.
MAURY, D. H., Washington, D. C.	*Displacement Pumps, Power Test,* s.
MAXIM, H. P., Hartford, Conn.	*Hartford Branch, Conn.*
MAYHEW, RAY, Minneapolis, Minn.	*Minnesota Section*
MAYO, E. C., Worcester, Mass.	(c) *Worcester Section*
MERING, B. G., Indianapolis, Ind.	*Indianapolis Section*
MERRILL, J. J., Chicago, Ill.	*Chicago Section*
MILBRATH, A. F., Milwaukee, Wis.	*Gas Power, Meetings,* s.
MILLER, EDWARD F., Cambridge, Mass.	*Boiler Code*
MILLER, EDWARD F., Cambridge, Mass.	*Refrig. Machines and Plants, Power Test,* s.
MILLER, EDWARD F., Cambridge, Mass.	*Main Com. Power Test Codes*
MILLER, SPENCER, New York City	*Vice-President*
MILLER, SPENCER, New York City	*Naval Consulting Board*
MILNE, JAMES, Toronto, Canada	*Ontario Section*
MIX, MELVILLE W., Mishawaka, Ind.	*Protection of Industrial Workers*
MOLDENKE, RICHARD, Watchung, N. J.	*Foundry Practice, Meetings,* s.
MONROE, W. S., Chicago, Ill.	*Complete Steam Power Plants, Power Test,* s.
MOODY, LEWIS F., Philadelphia, Pa.	*Philadelphia Section*
MOODY, LEWIS F., Philadelphia, Pa.	*Centrif. Pumps, Power Test,* s.
MOODY, LEWIS F., Philadelphia, Pa.	*Main Com. Power Test Codes*
MOORE, JAMES W., Birmingham, Ala.	*Birmingham Section*
MOORE, M. F., Kewanee, Ill.	*Boiler Code*
MORRISON, HUNTER, Cleveland, O.	*Standardization of Shafting*
MORRISON, J. P., St. Louis, Mo.	*St. Louis Section*
MOSES, W. B., New Orleans, La.	*New Orleans Section*
MOSS, S. A., West Lynn, Mass.	*Centrif. and Turbo-Compressors, Power Test,* s.
MOSS, S. A., West Lynn, Mass.	*Steam Turbines, Power Test,* s.
MOULTROP, I. E., Boston, Mass.	*Boiler Code*
MOULTROP, I. E., Boston, Mass.	*U. E. S. Board of Trustees*
MOULTROP, I. E., Boston, Mass.	*Steam Turbines Power Test,* s.
MUDD, J. P., Philadelphia, Pa.	*Philadelphia Section*
MULLER, E. A., Cincinnati, O.	*Cincinnati Section*
MURPHY, W. B., Philadelphia, Pa.	*Philadelphia Section*
MUSCHENHEIM, F. A., New York City	*House*
MYERS, DAVID MOFFAT, New York City	*Fuels, Power Test,* s.
NAILLER, B. F., Cleveland, O.	*Cleveland Section*
NEFF, PETER, Canton, O.	*Refrig, Machines and Plants, Power Test,* s.
NELLES, R. E., New York City	*Standardization of Shafting*
NEVILLE, WM. J., Atlanta, Ga.	*Atlanta Section*
NEWCOMB, CHARLES L., Holyoke, Mass.	*Manager*
NEWCOMB, ROBERT E., Holyoke, Mass.	*Foundry Practice, Meetings,* s.
NEWELL, F. H., Urbana, Ill.	*Public Relations*
NEWHALL, EZRA A., Norristown, Pa.	*Evaporating Apparatus, Power Test,* s.
NORCROSS, J. A., New Haven, Conn.	(c) *Connecticut Section*
NORCROSS, J. A., New Haven, Conn.	(c) *New Haven Branch, Conn.*
NORDMEYER, L. C., St. Louis, Mo.	*St. Louis Section*
NORRIS, H. M., Cincinnati, O.	*Cincinnati Section*
OBERG, ERIK V., New York City	*War Industries Readjustment*
OBERT, C. W., New York City	*Boiler Code*
O'NEIL, FREDERICK W., New York City	*Air Machinery, Meetings,* s.
ORROK, GEORGE A., New York City	(c) *Heat Transmission, Research,* s.
ORROK, GEORGE A., New York City.	*Condenser Units and Feed Water Heaters, Power Test,* s.

Name	Committee
ORROK, GEORGE A., New York City	(c) *Publication and Papers*
ORROK, GEORGE A., New York City	*Council*
PARKER, JAMES W., Detroit, Mich.	*Complete Steam Power Plants, Power Test,* s.
PARKER, JAMES W., Detroit, Mich	*Steam Turbines, Power Test,* s.
PARKER, JAMES W., Detroit, Mich	*Main Com. Power Test Codes*
PARR, S. W., Urbana, Ill	*Fuels, Power Test,* s.
PARROCK, H. P., Buffalo, N. Y	*Buffalo Section*
PARSONS, GEORGE K., New York City	*Aims and Organization*
PARSONS, GEORGE K., New York City	*New York Section*
PARSONS, GEORGE K., New York City	(c) *War Industries Readjustment*
PATITZ, J. F. MAX, Milwaukee, Wis	*Steam Eng's, Power Test,* s.
PECK, E. C., Washington, D. C	*Nat. Screw Thread Commission*
PERKINS, G. HAWTHORNE, Lowell, Mass	*Textiles, Meetings,* s.
PIGOTT, REGINALD J. S., Bridgeport, Conn	*Cost of Electric Power*
PIGOTT, REGINALD J. S., Bridgeport, Conn.	*Def. and Values, Power Test,* s.
PIGOTT, REGINALD J. S., Bridgeport, Conn.	*U. S. Bureau of Mines, Advisory Committee*
PIGOTT, REGINALD J. S., Bridgeport, Conn	*Research*
PIGOTT, REGINALD J. S., Bridgeport, Conn.	(c) *Fluid Meters, Research,* s.
PLUNKETT, CHAS. T., Adams, Mass	(c) *Textiles, Meetings,* s.
POND, H. O., New York City	*House*
POOLE, C. P., Atlanta, Ga	*Atlanta Section*
POPE, GEO. S., Washington, D. C	*Fuels, Power Test,* s.
POPPENHUSEN, P. A., Chicago, Ill	*Chicago Section*
PORTER, WILL R., Prince Bay, N. Y	*Tolerances in Screw Thread Fits*
POTTER, A. A., Manhattan, Kans.	*Complete Steam Power Plants, Power Test,* s.
PRATT, A. D., New York City	*Heat Transmission, Research,* s.
PRATT, A. D., New York City	*Boilers, Power Test,* s.
PRYOR, F. L., Hoboken, N. J.	*Complete Steam Power Plants, Power Test,* s.
PUGSLEY, E., New Haven, Conn	*New Haven Branch, Conn.*
PUTNAM, J. R., Waterbury, Conn	*Waterbury Branch, Conn.*
QUAYLE, ROBT., Chicago, Ill	*Chicago Section*
RATHBUN, G. J., Toledo, O	*Gas Producers, Power Test,* s.
RAUTENSTRAUCH, WALTER, New York City.	*U. S. Bureau of Mines, Advisory Committee*
RAUTENSTRAUCH, WALTER, New York City	*Worm Gearings, Research,* s.
RAUTENSTRAUCH, WALTER, New York City	*Research*
RAUTENSTRAUCH, WALTER, New York City	*Meetings and Program*
REDFIELD, S. B., Phillipsburg, N. J.	*Displ. Compressors and Blowers, Power Test,* s.
REED, CHESTER T., Worcester, Mass	*Worcester Section*
REED, RICHARD D., Westfield, Mass	*Boiler Code*
REPATH, C. H., Los Angeles, Cal	*Aims and Organization*
REYNOLDS, P. E., New York City.	*Condenser Units and Feed Water Heaters, Power Test,* s.
RICE, A. L., Chicago, Ill	*Chicago Section*
RICE, CALVIN W., New York City	*Engrg. Soc. Library*
RICE, CALVIN W., New York City	*Secretary*
RICE, CALVIN W., New York City	*U. E. S. Library Board*
RICE, RICHARD H., West Lynn, Mass	*Air Machinery, Meetings,* s.
RICE, RICHARD H., West Lynn, Mass.	*Centrif. and Turbo-Compressors, Power Test,* s.
RICE, RICHARD H., West Lynn, Mass	*Steam Turbines, Power Test,* s.
RICE, RICHARD H., West Lynn, Mass	*Main Com. Power Test Codes*
RICHARDS, C. RUSS, Urbana, Ill	*Fuels, Power Test,* s.
RICHARDS, C. RUSS, Urbana, Ill	*Local Sections*
RICHARDS, C. RUSS, Urbana, Ill	*Manager*
RICKETTS, E. B., New York City	*Boilers, Power Test,* s.
RICKETTS, E. B., New York City	*Feedwater Heater Standardization*
RINK, GEO. W., Jersey City, N. J	*Railroads, Meetings,* s.
ROBERTS, E. P., Akron, O	*Cleveland Section*
ROBINSON, S. M., Washington, D. C	*Natl. Screw Thread Commission*
ROCKWOOD, G. I., Worcester, Mass	*Aims and Organization*
ROE, JOS. W., New Haven, Conn	*Publication and Papers*
ROGERS, F. H., Philadelphia, Pa	*Centrif. Pumps, Power Test,* s.
ROGERS, L. C., Detroit, Mich	*Evaporating Apparatus, Power Test,* s.
ROTTER, MAX, St. Louis, Mo	*Gas and Oil Engines, Power Test,* s.
ROUECHE, W. LEE, Birmingham, Ala	*Birmingham Section*
ROWNTREE, F. L., Meriden, Conn	*Meriden Branch, Conn.*
ROYER, T. J., Los Angeles, Cal	*Los Angeles Section*
SAGUE, JAMES E., New York City	*Public Relations*
SAGUE, JAMES E., New York City	*Constitution and By-Laws*
ST. LAWRENCE, J., Erie, Pa	*Erie Section*
SARGENT, HENRY B., New Haven, Conn	*Vice-President*
SARGENT, HENRY B., New Haven, Conn	*Exec. Com. Council*
SCHADEK, E. W., St. Louis, Mo	*St. Louis Section*
SCHEFFLER, FRED A., New York City	*War Industries Readjustment*
SCHELLENBACH, W. L., Cincinnati, O	*Machine Tool Standardization*
SCHMIDT, E. C., New York City	*Locomotives, Power Test,* s.
SCOTT, EARL F., Atlanta, Ga	*Atlanta Section*
SCOTT, EARL F., Atlanta, Ga	*Aims and Organization*
SCOTT, FRANK A., Cleveland, O	*Industrial Relations*
SEYMOUR, JAMES A., Auburn, N. Y	*Main Com. Power Test Codes*
SEYMOUR, JAMES A., Auburn, N. Y.	*Gas and Oil Engines, Power Test,* s.
SETZ, H. R., New York City	*Gas Power, Meetings,* s.
SHARPE, HENRY D., Providence, R. I	*Industrial Relations*
SHERWOOD, M. W., Erie, Pa	(c) *Erie Section*
SHIPLEY, THOMAS, Brooklyn, N. Y.	*Refrig. Machines and Plants, Power Test,* s.
SHIRLEY, J. B., Hartford, Conn	*Small Hose Couplings*
SMALLWOOD, J. C., Baltimore, Md	*Baltimore Section*
SMITH, CARL D., Washington, Pa	*Gas Producers, Power Test,* s.
SMITH, ELMER, Boston, Mass	*Boston Section*
SMITH, H. F., Lexington, O	*Gas Power, Meetings,* s.
SMITH, HARRY F., Dayton, O	*Main Com. Power Test Codes*
SMITH, HARRY F., Dayton, O	*Gas Producers Power Test,* s.
SMITH, H. J., Cleveland, O	*Cleveland Section*
SMITH, JESSE M., New York City	(c) *Constitution and By-Laws*
SMITH, JESSE M., New York City	*Engrg. Soc. Library*
SMITH, JESSE M., New York City	*Memorial to Dr. F. R. Hutton*
SMITH, JESSE M., New York City	*Council*
SMITH, J. WALDO, New York City	*Public Relations*
SMOTT, C. H., New York City.	*Centrif. and Turbo-Compressors, Power Test,* s.
SNYDER, G. T., Lorain, O	*Cleveland Section*
SPALDING, C. M., Erie, Pa	*Aims and Organization*
SPALDING, C. M., Erie, Pa	*Erie Section*
SPENCER, HENRY, Cambridge, Mass.	*Machine Shop Practice, Meetings,* s.
SPILLMAN, M., Harrison, N. J	*Centrif. Pumps, Power Test,* s.
SPILSBURY, E. G., New York City	*Engineering Foundation*
SPILSBURY, E. G., New York City	*U. E. S. Board of Trustees*
SPITZGLASS, J. M., Chicago, Ill	*Gas Power, Meetings,* s.
SPRAGG, C. G., Milwaukee, Wis.	*Displ. Compressors and Blowers, Power Test,* s.
STARKWEATHER, W. G., Boston, Mass	*Meetings and Program*
STARKWEATHER, W. G., Boston, Mass	(c) *Boston Section*
STEVENS, JOHN A., Lowell, Mass	(c) *Boiler Code*
STEVENS, JOHN A., Lowell, Mass	*Vice-President*
STEVENS, JOHN A., Lowell, Mass	(Act. c.) *Cost of Electric Power*
STILL, FREDERICK R., Detroit, Mich.	*Displ. Compressors and Blowers, Power Test,* s.
STILL, FREDERICK R., Detroit, Mich	*Main Com. Power Test Codes*
STILLMAN, EDWIN A., New York City	*Flange and Pipe Fittings*
STODDARD, ELGIN, San Francisco, Cal	*San Francisco Section*
STORER, NORMAN W., Pittsburgh, Pa	*Railroads, Meetings,* s.
STOUT, W. B., Detroit, Mich	*Gas Power, Meetings,* s.
STRATTON, J. H., Cleveland, O	*Cleveland Section*
STRATTON, S. W., Washington, D. C	(c) *Natl. Screw Thread Com.*
STRATTON, S. W., Washington, D. C	(c) *Washington Section*
STRATTON, S. W., Washington, D. C	*Def. and Values, Power Test,* s.
STRAUB, C. LEE, Springfield, Mass	*Gas Producers, Power Test,* s.
STROTHMAN, LOUIS E., Milwaukee, Wis	*Aims and Organization*
STROTHMAN, LOUIS E., Milwaukee, Wis	*Milwaukee Section*
STROTHMAN, LOUIS E., Milwaukee, Wis.	*Displacement Pumps, Power Test,* s.
STROTHMAN, LOUIS E., Milwaukee, Wis	*Main Com. Power Test Code*
SWASEY, AMBROSE, Cleveland, O	*John Fritz Medal Board*
SWASEY, AMBROSE, Cleveland, O	*Memorial to Dr. F. R. Hutton*
SYMONS, W. E., New York City	(c) *Finance*
SYMONS, W. E., New York City	*Increase of Membership*
SYMONS, W. E., New York City	*Council*
TAYLOR, H. B., Philadelphia, Pa	*Philadelphia Section*
TEACH, J. A., Minneapolis, Minn	(c) *Minnesota Section*
THOMAS, CARL C., Hog Island, Phila	*Steam Turbines, Power Test,* s.
THOMAS, CARL C., Hog Island, Phila.	*U. S. Bureau of Mines, Advisory Committee*
THOMAS, CARL C., Hog Island, Phila	(c) *Air Machinery, Meetings,* s.
THOMAS, CARL C., Hog Island, Phila	*Research*
THOMAS, EDWARD W., Lowell, Mass	*Textiles, Meetings,* s.
THOMPSON, H. B., Wernesville, Pa	*Textiles, Meetings,* s.
THOMPSON, HUGH L., Waterbury, Conn	(c) *Waterbury Branch, Conn.*
TIMMIS, W. S., New York City	*Membership*
TOLTZ, MAX, Baltimore, Md	*Locomotive, Power Test,* s.
TOLTZ, MAX, Baltimore, Md	*Vice-President*
TRUMP, E. N., Syracuse, N. Y	*Main Com. Power Test Code*
TRUMP, E. N., Syracuse, N. Y	*Fuels, Power Test,* s.
TRUMP, E. N., Syracuse, N. Y	*Evaporating Apparatus, Power Test,* s.
TUBBY, C. W., St. Paul, Minn	*Aims and Organization*
TURNER, CHAS. PRENTIS, Steelton, Pa.	*Displ. Compressors and Blowers, Power Test,* s.
TWINING, WALTER S., Philadelphia, Pa	*Standardization*
UHL, WILLIAM F., Boston, Mass	*Water Wheel Code, Power Test,* s.
UHL, WILLIAM F., Boston, Mass	*Main Com. Power Test Codes*
UPP, J. W., Schenectady, N. Y	(Act. c) *Protection of Ind. Workers*
UPSON, MAXWELL M., New York City	*House*
UPTON, GEORGE B., Ithaca, N. Y	*Lubrication, Research,* s.
VAN DERHOEF, G. N., New York City	*Standardization of Shafting*
VAN DEVENTER, J. H., Washington, D. C	*Machine Tool Standardization*
VARNEY, W. W., Baltimore, Md	*Baltimore Section*
VAUGHAN, H. H., Montreal, Canada	*American Engineering Standards*
VAUGHAN, H. H., Montreal, Canada	*Railroads, Meetings,* s.
VAUGHAN, H. H., Montreal, Canada	*Boiler Code*
VEEDER, C. H., Hartford, Conn	*Hartford Branch, Conn.*
VIALL, W. A., Providence, R. I	(c) *Machine Shop Practice, Meetings,* s.
VIALL, W. A., Providence, R. I	*Protection of Industrial Workers*
VIALL, W. H., Providence, R. I	*Screw Thread Gages*
VOGT, AXEL S., Altoona, Pa	*Flanges and Pipe Fittings*

Name	Committee
VOSE, F. H., Cleveland, O.	*Steam Eng'g, Power Test, s.*
WAGNER, F. C., Terre Haute, Ind.	*Indianapolis Section*
WALDEN, A. E., Baltimore, Md.	*Aims and Organization*
WALDEN, A. E., Baltimore, Md.	*(c) Baltimore Section*
WALDRON, FREDERICK A., New York City	*Membership*
WALDRON, FREDERICK A., New York City	*(c) Industrial Buildings*
WALLACE, L. W., Indianapolis, Ind.	*(c) Indianapolis Section*
WEBSTER, HOSEA, New York City	*Membership*
WELLS, FRANK O., Greenfield, Mass.	*Natl. Screw Thread Com.*
WELLS, FRANK O., Greenfield, Mass.	*International Cor. Com. on Screw Threads*
WELLS, FRANK O., Greenfield, Mass.	*Screw Threads and Threaded Parts*
WELLS, FRANK O., Greenfield, Mass.	*Manager*
WELLS, FRANK O., Greenfield, Mass.	*Tolerances in Screw Thread Fits*
WELLS, H. E., Bridgeport, Conn.	*Bridgeport Branch, Conn.*
WESCHLER, GEORGE A., Washington, D. C.	*Washington Section*
WEST, ARTHUR, So. Bethlehem, Pa.	*Main Com. Power Test Codes*
WEST, ARTHUR, So. Bethlehem, Pa.	*Gas and Oil Engine Power Test, s.*
WEYMOUTH, C. R., San Francisco, Cal.	*Manager*
WHITACRE, R. B., St. Paul, Minn.	*Minnesota Section*
WHITE, WILLIAM M., Milwaukee, Wis.	*Flanges and Pipe Fittings*
WHITE, WILLIAM M., Milwaukee, Wis.	*Centrif. Pumps, Power Test, s.*
WHITE, WILLIAM M., Milwaukee, Wis.	*(c) Milwaukee Section*
WHITNEY, C. E., Hartford, Conn.	*Steel Roller Chains*
WHITTEMORE, H. L., Washington, D. C.	*Washington Section*
WHITTEMORE, H. L., Washington, D. C.	*Protection of Industrial Workers*
WHITTLESEY, J. T., San Francisco, Cal.	*Aims and Organization*
WILEY, WILLIAM H., New York City	*Memorial to Dr. F. R. Hutton*
WILEY, WILLIAM H., New York City	*Treasurer*
WILEY, WILLIAM H., New York City	*Council*
WILKIN, J. T., Connersville, Ind.	*Disp. Compressors and Blowers, Power Test, s.*
WILLIAMS, LOUIS W., New York City	*Standardization of Shafting*
WILLIAMSON, GEORGE E., Mittineague, Mass.	*Worcester Section*
WILLISTON, A. L., Brookline, Mass.	*(c) Increase of Membership*
WINTROATH, J. A., Memphis, Tenn.	*Los Angeles Section*
WOOD, ALBERT C., Philadelphia, Pa.	*Main Com. Power Test Codes*
WOOD, ALBERT C., Philadelphia, Pa.	*Def. and Values, Power Test, s.*
WOOD, A. J., State College, Pa.	*Heat Transmission, Research, s.*
WOOD, BENJAMIN F., Maplewood, N. J.	*Cost of Electric Power*
WOOD, F. L., Meriden, Conn.	*Meriden Branch, Conn.*
WOOLSON, IRA H., New York City	*Constitution and By Laws*
WORTHINGTON, WALTER F., Brooklyn, N. Y.	*Tolerances in Screw Thread Fits*
WRIGHT, PAUL, Birmingham, Ala.	*Birmingham Section*
WRIGHT, R. V., New York City	*Meetings and Program*
YARNALL, D. ROBERT, Philadelphia, Pa.	*(c) Local Sections*
YARNALL, D. ROBERT, Philadelphia, Pa.	*Manager*
YARNALL, D. ROBERT, Philadelphia, Pa.	*Council*
YOUNG, CHARLES D., Altoona, Pa.	*Tolerances in Screw Thread Fits*
YOUNG, C. D., Altoona, Pa.	*Locomotives, Power Test, s.*
YOUNG, GILBERT A., Lafayette, Ind.	*Indianapolis Section*
ZIMMERMAN, D. B., Washington, D. C.	*Natl. Screw Thread Commission*
ZUSI, N. E., Boston, Mass.	*Machine Shop Practice, Meetings, s.*

Year Book Shows Membership of 10,192

THE Year Book of The American Society of Mechanical Engineers, 1919 edition, is now being distributed.

The major part of the volume consists of an alphabetical directory of members of the Society, with their business connections and mailing addresses. The list this year contains 10,192 names, which is an increase of 1492 over last year, and which now places this Society in the lead of the corresponding societies of civil, electrical and mining engineers.

A feature of this year's volume is a rearrangement of the committees into a classified order, and the addition of sub-titles following names of committees describing their character and scope. All members, and particularly new members, are urged to study this committee list, which indicates the fundamental organization of the Society.

The General Information section has been revised and the latest information included. Local Sections committees, in particular, will find this part of the book of value for reference.

The Geographical List of members has been omitted from the main volume this year. The decision to make this change was taken by the Publication Committee last fall, when the Paper and Pulp Division of the War Industries Board were requesting conservation of paper. The tendency has been for the Year Book volume to become unwieldy by virtue of the rapid growth of the membership, so it was felt that a policy of issuing the Geographical List as a separate volume could well be inaugurated. Incidentally, this Geographical List makes a convenient little volume for pocket use and answers just as well as the Year Book for members who are traveling. Every member is entitled to a copy of this list upon request.

At the back of the volume are printed forms for notifying the Secretary of changes of addresses. It is hoped that members will use these promptly when occasion arises; last year the Society received 7428 requests for changes of addresses, and of these 3848 were sent in during the last quarter. The load in the office at this time, therefore, became quite unprecedented, but it is hoped that the accuracy of the work of making changes on all the records kept was not impaired.

A Letter from Cuba

A LETTER has been received by the Secretary from a junior member of the Society, Lieut. E. C. Bliss, U. S. N. R. F., officer on the U. S. Fleet Repair Ship *Vestal*, describing the life on board the ship and the nature of the repairs which they are called upon to make. A few paragraphs from the letter are given below.

We were located for some months off Yorktown, Va., in the York River, with all of the Fleet about us. All kinds of repairs were made to practically all of the ships, some of the work being very simple and some very complex. Today, for instance, we have four machinists working on one of the best known of the battleships and lining up the shafting to the training gear of the turret, which gives a little idea of the nature of some of the jobs done by a repair ship.

In the trip down to our present station at Guantanamo Bay, Cuba, we received a wireless that the steering engine of the U. S. S. *Florida* was broken. This was, of course, a job for us, and the first one upon our arrival. The engine was badly broken, due to neglect to take into consideration the fact that machinery, even if made of iron and steel, will wear. The shafts were badly bent and some big iron brackets broken. This is now all fixed up and the ship is at sea.

Some of the inquiries we get do not relate to the ship proper at all. For instance, last Sunday one of the battleships wanted us to send over a man to fix a player piano on board, while still another put in a call for a new spring for a graphaphone. These requests, of course, we had to refuse. On one of our largest battleships, such as they came from, there ought to be Yankees enough to fix them up.

This is a beautiful country, with one of the best climates imaginable. On the Bay are two small towns and a fine Naval Station, which is small but very complete, with foundry, storehouses, machine shops and marine railroad.

Committee on Aims and Organization

The plans of the Committee on Aims and Organization have now been modified slightly, and a general meeting of the Committee will be held about the end of April. The Committee will also report at the business session of the Spring Meeting in Detroit on Monday, June 16.

The Executive Committee held a meeting the first week in March, and decided to issue a questionnaire to all engineering societies to secure information to assist in the preparation of that part of the report dealing with the organization of the engineering profession.

Nominations for Offices of the Am. Soc. M. E.

FOR ELECTION IN DECEMBER, 1919

The President, Mortimer E. Cooley, has appointed the following regular nominating committee, consisting of A. G. Christie, Baltimore, Md., H. J. Hinchey, Atlanta, Ga., T. H. Hinchman, Detroit, Mich., J. V. Martenis, Minneapolis, Minn., and Robert Sibley, San Francisco, Cal. This committee is to nominate candidates for the offices which fall vacant in December next, namely:

President, to hold office for one year
Three vice-presidents, to hold office for two years
Three managers, to hold office for three years
Treasurer, to hold office for one year.

Following precedent these names were selected by the Local Sections, which were divided into five groups for the purpose.

This Nominating Committee is to meet at the Spring Meeting, Detroit, Mich., June 16 to 19, and would be pleased to receive suggestions from the membership. Recommendations of names for any or all of the elective offices should be sent to the Secretary, 29 West 39th St., New York City, not later than May 1.

AMONG THE LOCAL SECTIONS

The Secretary Visiting the Sections

MR. RICE is again in the field, this time visiting Houston, Tex., as the guest of the Chamber of Commerce and also in the interest of the formation of a Local Section, Los Angeles, San Francisco, Portland, Seattle, Spokane, Moscow, Idaho, Butte, Salt Lake City, Denver, Omaha and Chicago.

This is the third trip of the Secretary this year in the interest of the Local Sections, and when completed will have taken him to all the Local Sections in the country, and to those places at which Sections are contemplated.

Mr. Rice, in his discussion of Society affairs, emphasizes the duty and obligation of all members to contribute to the advancement of the engineering profession. He is pointing out that engineers should give a great deal of thought to the welfare of the general public. He is preaching the gospel that every member of this Society owes his allegiance also to the local society, and that his services in all matters pertaining to the general public should be offered through this Society.

Mid-Continent Section Authorized

A meeting of the members of The American Society of Mechanical Engineers was held in Tulsa, Okla., on February 5. Secretary Rice delivered the principal address, in which he emphasized the purposes of the Society and the benefits to be derived from membership. An entertainment program consisting of a luncheon at Hotel Tulsa, and afterward a trip of inspection to the West Tulsa refineries of Cosden and Company, was provided.

This meeting resulted in a petition to the Council for the establishment of a Mid-Continent Section, with headquarters at Tulsa, under the direction of the following Executive Committee: Hollis P. Porter, *Chairman;* John H. McEwen, *Vice-Chairman;* Dean E. Foster, *Secretary;* Frank P. Peterson, *Treasurer,* and W. G. Williams, *Executive Committeeman at Large.* The Council, at its February meeting, received the petition and authorized the formation of this Section, to include the following territory: Kansas, Oklahoma, northern Texas on a line running east and west from Fort Worth, a portion of Louisiana, and Arkansas. These boundaries were decided upon to coincide as nearly as possible with the section of the A. I. M. E., with which it is hoped the new Section will coöperate.

The following plans for the activities of this Section are given in the petition:

It is proposed that this Section be made strictly professional in scope, and since the territory to be covered contains the famous Mid-Continent oil fields, its meetings and discussions will have to do mainly with problems related to the various phases of the oil industry located therein. At one time it was proposed that this Section be called The Petroleum Section of the A.S.M.E. Objection to this title was made by some of the membership on the ground that such a name would tend to exclude those members not interested in the petroleum industry from participation in the Section's activities. It was for this reason that the name was changed so as to make the Section's work quite general in nature and yet allow it to devote its principal attention to petroleum problems.

Meetings of Sections

THE Committee on Local Sections held a meeting in Pittsburgh on February 22 in connection with the Council Meeting, at which important developments of the organization were considered.

The Executive Committee of the new Washington Section, consisting of Dr. S. W. Stratton, *Chairman;* Mr. J. H. Klinck, *Vice-Chairman;* Mr. G. A. Wechler, *Secretary;* Mr. H. L. Whittemore, and Mr. A. E. Johnson was recorded.

The petition of the members in Tulsa, Oklahoma, for the formation of a Mid-Continent Section was approved and referred to the Council.

ATLANTA SECTION

A joint meeting of the Birmingham, New Orleans and Atlanta Sections was held on March 21 at Atlanta. In the morning an inspection trip was made to the Fulton Bag and Cotton Mills. An address on Powdered Fuel was delivered in the evening by N. C. Harrison, general superintendent of the Atlantic Steel Company.

W. J. NEVILLE,
Secretary.

BALTIMORE SECTION

The Baltimore Section was invited to attend the series of lectures being given through the courtesy of J. E. Aldred at Johns Hopkins University on Engineering Practice. On March 5, James Hartness, Past President, Am.Soc.M.E., spoke on The Human Element in the Machine Shop; on March 12, Rear Admiral Frederic R. Harris, U. S. N., Retired, spoke on Berthing and Repair Docks for Shipping; on March 26, C. W. Price, Field Secretary of the National Safety Council, spoke on Safety from the Standpoint of Industrial Efficiency. The remaining lectures of the series are announced on the Coming Meetings page of this Section.

A. G. CHRISTIE,
Secretary.

BOSTON SECTION

The members of the Boston Section held a meeting at the Engineers' Club on March 13, at which H. W. Rowley, Chief Engineer of the Boston Development and Sanitary Company, delivered an address on the Final Disposition of City Wastes.

Mr. Rowley described the methods of collection which separate paper and ashes from other materials and told how the remaining materials are treated to obtain various oils, chemicals, etc. He showed a number of illustrations on the suitability for gardening purposes of former under-water land filled in by them. He stated that the idea of utilizing kitchen and table refuse for raising hogs was good in theory but was spoiled in practice by the presence of inedible materials such as discarded moving-picture films, needles for talking machines, etc., which are samples of the many types of injurious articles which are continually found in such material. The total collections for one year in the City of Boston, Mr. Rowley said, amounted to about 400,000 tons, and he very carefully pointed out the healthfulness of the work to their employees as proved by comparative statistics.

ELMER SMITH,
Secretary.

CINCINNATI SECTION

Members of the Cincinnati Section were invited to attend the meeting of the Engineers' Club on Thursday, February 20, at the Literary Club rooms. Ward Baldwin delivered the address of the evening on Terminal Transportation and Grade-Crossing Problems of Cincinnati.

A joint meeting of the Engineers' Club and the Cincinnati Section was held on Thursday, March 20, at the Literary Club rooms. Chas. H. Fox, Mem.Am.Soc.M.E., President, of The Ahrens-Fox Fire Engine Co., delivered an address on the Evolution of the Fire Engine.

JOHN T. FAIG,
Secretary.

CONNECTICUT SECTION

Meriden Branch

A meeting on Industrial Training was held on February 28 to which the members of the Meriden Manufacturers Association were invited. John C. Spence, Superintendent of the Norton Grinding Company, read a very interesting paper on The Training Department During and After the War and it was well illustrated with lantern slides. Charles T. Clayton, Director of the U. S. Training Service, and H. C. Miles, Chief of Training of the U. S. Training Service, also spoke.

C. K. DECHERD,
Chairman.

New Haven Branch

On March 7, at 4 p. m., at Lampson Lyceum, Lieutenant Commander D. C. Buell, U. S. N. R. F., delivered a lecture on Long-Range Navy Guns with Railway Mount, describing the 14-in. naval guns, weighing 585,000 lb., which were used with great effectiveness in service in France. This meeting was held under the joint auspices of the Yale Mechanical Engineers' Club and the New Haven Branch.

Dean M. E. Cooley, President, addressed the members of the Connecticut Section at the Mason Laboratory on March 19.

E. H. LOCKWOOD,
Secretary.

LOS ANGELES SECTION

The Los Angeles Section held a very successful meeting at Hotel Clark on March 13. Calvin W. Rice and George G. Anderson, Chairman of the Local Society of the A. S. C. E., were entertained as visitors who contributed very materially to the success of the meeting by each making a short address. Professor Ford, of Throop College of Technology, delivered a lecture on the subject of the Behavior of Steels under Test.

T. J. ROYER,
Secretary.

MINNESOTA SECTION

The March meeting of the Minnesota Section was held Tuesday evening, March 4, at The Midway Café. W. H. Adams, Superintendent of the Minnesota Sugar Company, gave an address on The Manufacture of Beet Sugar.

RAY MAYHEW,
Secretary.

NEW YORK SECTION

An Engineers' Symposium was held on Wednesday, March 26, at 8 P. M., in the Auditorium of the Engineering Societies Building, under the general auspices of the Local Sections of the American Institute of Mining and Metallurgical Engineers, American Society of Mechanical Engineers, and the Society of Automotive Engineers, and in which the members of the American Institute of Electrical Engineers, American Society of Civil Engineers, American Chemical Society, American Electrochemical Society, American Institute of Chemical Engineers, American Society of Heating and Ventilating Engineers, American Society of Refrigerating Engineers, Brooklyn Engineers' Club, Illuminating Engineering Society, Institute of Radio Engineers, Municipal Engineers of the City of New York, Société de Chimie Industrielle, Society of Chemical Industry, and the Society of Naval Architects and Marine Engineers were cordially invited to participate.

The general title of the meeting was The Engineer as a Citizen. Gano Dunn, President of the J. G. White Engineering Corporation, presided, and the following addresses were delivered: The Civic Responsibility of the Engineer, by Philip N. Moore; The Relation of the Engineer to Legislation, by Calvert Townley of the Westinghouse Elec. & Mfg. Company; The Relation of the Engineer to Administration, by Nelson P. Lewis of the Public Service Commission; The Relation of the Engineer to Public Opinion, by Spencer Miller of the Lidgewood Mfg. Company, and The Relation of the Engineer to Production and Distribution, by Comfort A. Adams, President of the A. I. E. E.

A general discussion followed the meeting, which will be recorded in detail in the May issue.

W. W. MACON,
Chairman.

PHILADELPHIA SECTION

On March 25 the Philadelphia Section held its monthly meeting at the Engineers' Club, preceded by a dinner at 6.30. Joseph A. Steinmetz, Mem.Am.Soc.M.E., of the firm of Janney, Steinmetz & Co., delivered the address of the evening on the question, What Are We to Do with Our Returned Aviators and Their Battle Planes?

JOHN P. MUDD,
Secretary.

ST. LOUIS SECTION

On Friday, February 28, the members of the St. Louis Section held an informal dinner meeting, of especial interest to the ladies, at the Hotel Statler, Daniel Boone Room.

C. B. Lord, Superintendent of the Wagner Electric Company, spoke on Women in War Industries, and Mrs. Lord was present as the guest of the ladies.

A meeting of the St. Louis Section was held at the Hotel Statler on March 21, at which Prof. A. S. Langsdorf, Dean of the Schools of Engineering and Architecture of Washington University delivered an address on "Industry, Research and the Engineer." Professor Langsdorf has been a careful observer of industrial conditions for many years, and is of firm belief that the development of industrial arts will more and more demand the application of scientific principles and the discovery of new ones, necessitating the supplying of the industries with a sufficient number of trained engineers to carry on the scientific research.

J. P. MORRISON,
Secretary.

SAN FRANCISCO SECTION

On Wednesday, March 19, the members of the San Francisco visited the concrete ship being built by the Shipping Board at Alameda.

GEORGE L. HURST,
Secretary.

WORCESTER SECTION

Professor A. E. Kennelly, Director of the Department of Electrical Engineering, Harvard University, spoke at the Worcester Polytechnic Institute on March 6 on the subject of Field Ordnance and Field Ordnance Appliances. Professor Kennelly was for five months on the battlefields of France making a study of ordnance and the uses of the microphone and other devices used to locate the German heavy artillery. The lecture was illustrated by lantern slides.

CHARLES T. REED,
Secretary.

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications and positions listed below combine the services of the Society and of the Engineering Societies Employment Bureau, Room 903, Engineering Societies Building.

POSITIONS AVAILABLE

Stamps should be inclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society records.

TECHNICALLY TRAINED MAN in steam engineering, with knowledge of valves and pressure gages. Location, Bridgeport, Conn. D-048.

SQUAD LEADER to take charge of six to eight draftsmen on steam-turbine work; one experienced in turbine design, who can handle checking and some executive work. Permanent position for right man. Give full particulars in application. Location, Connecticut. D-049.

CHIEF ENGINEER. One of the best centrifugal-pump designers in the country. Location, New Jersey. D-050.

YOUNG TECHNICAL MAN experienced in electrical-heating appliances, with shop experience and understanding of practical mechanical end of the game. Salary $2,000 to $2,400 to start, with good opportunity for advancement. Location, Ohio. D-051.

POWER-HOUSE OPERATING ENGINEER, capable of assuming full charge of operation of turbine plant of approximately 30,000 kw. Must have experience with water-tube boilers, underfeed stokers, and hydraulic air-compressing and refrigerating equipment. Location, Ohio. D-054.

CIVIL ENGINEER in connection with our building work, to have experience in buildings of various kinds, underground piping and sewers and other branches of profession. Location, Ohio. D-055.

SALES ENGINEER, technical graduate with good practical experience, conversant with up-to-date shop practice, familiar with tool set-up, time-study work and production. Location, Middle West. D-056.

ENGINEER to take charge of the designing of automatic machinery, tools and fixtures, with varied experience that will bring new ideas in methods of manufacturing. Should have shop experience, be thoroughly practical and capable of designing for economical production. Location, Maryland. D-057.

PROGRESSIVE ENGINEER with ideas and experienced in farm-engine development. Experience in automobile, engine designing and manufacturing desirable. In first letter give complete experience, references, compensation. D-058.

ENGINEER to conduct field inspections of power and industrial plants. Graduate mechanical engineer with about ten years' experience in the construction and operation of power-plant machinery. Prefer man formerly employed by prominent engine or machine builders or who has held responsible operating positions. State age, training, experience, with previous salary. D-060.

FUEL ENGINEER to investigate economic use of fuel; good knowledge of combustion and ability to make boiler tests; should have analytical mind capable of devising rational methods of attacking new fuel problems. Salary, $3,000 per annum to the right man. D-062.

YOUNG MECHANICAL ENGINEERING GRADUATE as instructor in mechanical drawing. Good draftsman, preferably one with outside experience, previous teaching experience desirable, not essential. Location, Brooklyn. D-064.

PLANNING DEPARTMENT of Philadelphia concern manufacturing certain lines of hardware, as night latches, cabinet locks and pad locks, desires additional man at salary of about $2,000. D-065.

ENGINEERING AND SALES REPRESENTATIVES. Manufacturer of power-plant and heating equipment desires to establish connections in about 20 leading centers. Preference given to individuals with engineering experience already established in these centers who could combine such representation with one or two non-competitors in the same field. Give details of training, experience, present connections, terms, etc. D-069.

PROCESS DEVELOPMENT DEPARTMENT. High-grade man to take charge; mechanical experience in manufacturing small articles, as cameras, with tool-room procedure and methods. Sufficient general education to investigate

problems regarding japanning and lacquering, etc. Man of tact who can go into various departments and make investigations without antagonizing superintendents of departments. Duties will be to investigate certain problems in manufacturing and developing processes, whereby cost of manufacturing may be reduced. Salary depends on abilities to produce results. Location, New York State. D-071.

DRAFTSMAN for consulting engineer's office in the Mid-Continent field. Experience in oil refining, including skimming, wax, lubricating oils and coke. Salary according to experience, about $250 a month. D-073.

TECHNICAL GRADUATE for editorial staff, New England territory. Man who is enough of a self-starter to dig out his own tasks and and execute them with minimum of direction, as he would be located at distance from any of existing offices of company. Must combine engineering or shop experience with ability to write and to set down in convincing English the things he sees. Sufficiently attractive personality to make good impression on manufacturers; necessary to spend large part of time in machine shops and foundries studying production methods, from economic and executive standpoint, for purpose of developing articles on modern manufacturing methods based on actual practice. Position would require man who combines some knowledge of shop management, machine-tool construction and operation, with at least the elements of foundry practice. Man who is reasonably mature with satisfactory qualifications; good remuneration and excellent prospects for continued advancement. D-074.

ENGINEER with experience in substituting mechanical equipment for hand labor, preferably college graduate familiar with all kinds of conveying and handling equipment; also, familiar with handling costs. Good future for right man. Location near New York City. D-075.

MACHINE SHOP FOREMAN. Mechanic with technical education, ambitious. Experienced in production quantity runs of bushings or other small parts and tooling of automatic equipment necessary for low-cost production. Submit details, age, education, dependents, positions held last five years. Excellent opportunity for bright worker who can handle men and willing to work up to position of responsibility. Location, Pennsylvania. D-076.

YOUNG MAN to develop into sales engineer, educated in mechanical lines, particularly with knowledge of internal-combustion engines. Location, New York. D-863.

DRAFTSMAN AND DETAILERS for industrial plant lay-out work, preferably men with experience in elevating and conveying machinery. Salary $175 to $200 a month. State age, education, nationality, previous experience. D-873.

MACHINE SHOP FOREMAN. Mechanic with technical education. Ambitious, willing to work up to a clean collar job. Experienced on production bushings or other small parts quantity runs. Understands tooling of automatic equipment necessary for low cost production. Submit details, age, education, dependents, positions held last five years, an excellent opportunity for bright, peppy worker who can handle men. Location, Pennsylvania. D-076.

SUPERINTENDENT for manufacturing concern making brass fittings and general machined parts. Located in Middle West and employing about 400 hands. Applicant should be between 35 and 45 years of age and have unimpeachable record; able to handle men successfully and produce output at minimum cost. D-077.

POWER PLANT DESIGNING ENGINEER thoroughly familiar with modern power plant practice, capable of taking charge of design of complete power stations. Not detail design of apparatus, but apparatus to use and its relation to complete plant. Must be good estimator of equipment, but not structural features of power plant other than that necessary to support the equipment. Salary commensurate with ability and experience of the engineer selected. Location, Philadelphia. D-079.

TECHNICAL ASSISTANT who has had experience in engineering design, automotive work particularly. A knowledge of electrical engineering is also desirable. Location, Jersey City, N. J. D-079.

TIME AND MOTION STUDY MEN. Only men of the highest character and thoroughly experienced, capable of earning maximum in salary will be considered. Give references as to character and ability in first letter. Location, Middle West. D-080.

BRANCH SALES MANAGER, aggressive, executive, age 35 to 45 qualified to command attention, large interests in ball bearing, automobile or tractor fields. Charge of younger sales engineers; visit the trade when necessary, keeping in touch with field conditions. Salary commensurate with ability—name salary desired. D-081.

ELECTRICAL ENGINEER in charge of installation and maintenance. Man between 30 and 35 years of age, an A-1 man. Salary between $3,000 and $5,000 per year. Location, Middle West. D-082.

ENGINEER who can invest $10,000 in an established company. One capable of selling and superintending installations of combustion control system, acquainted with best firing methods for power plants and thoroughly familiar with the details of operation. Good salary to start. Location, Philadelphia. D-083.

PROGRESSIVE PULP AND PAPER MANUFACTURING CONCERN in Canada offers excellent opportunity to engineering draftsman competent to design ordinary mill buildings, including structural steel and reinforced concrete floors, tanks, etc., also general layouts of machinery. Single man with some knowledge of paper and pulp mill construction preferred, but latter not essential. D-084.

ASSISTANT TO MASTER MECHANIC. Progressive pulp and paper manufacturing company in Canada offers excellent opportunity for advancement to man with mechanical and executive ability. Must be able to read blue prints, layouts and supervise millwrights on repair work; systematic work with modern efficient methods. D-085.

SALES ENGINEER, high type, desired by Eastern manufacturer of pressure gages. Location, New York. D-086.

SUPERINTENDENT to take charge of growing factory employing 250 making highest grade brass and iron steam fittings. Must have technical education, with practical experience in brass industry and knowledge of best methods in design, tooling and handling to economically produce quality and quantity. Opportunity for man of exceptional character and ability. Give full details of age, height, and weight, education, experience, present salary and position. Data and name kept confidential. D-087.

MECHANICAL ENGINEER, with technical and practical experience in designing and constructing plants and machinery, and who has the proper classifications to superintend and direct designing, construction work, testing, etc., in plant employing thousand to fifteen hundred men. Location, New York State. D-088.

MACHINE TOOL DESIGNER, thoroughly experienced, having practical knowledge of heavy automatic metal turning machinery. Write stating qualifications. Location, New England. D-089.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 12th of the month, and the form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

MECHANICAL ENGINEER, technical graduate, age 28, married. Experienced in heat and frost-insulation engineering both sales and construction. Available April 5, but can report earlier if necessary. Salary and requirements expected in reply. D-293.

MECHANICAL ENGINEER, age 30 years, technical graduate with six years' practical experience in power-plant operation, maintenance, and general shop work. For the past 18 months, First Lieutenant, U. S. Army, in charge of artillery repairs; charge of large steam-electric power equipment and maintenance of general mechanical equipment. Minimum salary expected $3000 a year. D-294.

MECHANICAL ENGINEER, technical graduate, age 28, married, desires position in sales or engineering department of established automobile or mechanical manufacturing company having good future opportunities. Middle West location preferred. D-295.

MECHANICAL ENGINEERING GRADUATE, mechanical or electrical draftsman, or associate professor teaching mechanical and electrical engineering. Married, age 30. Six years' general experience, operating, testing, drafting on large generating stations and sub-stations; heating and ventilating installations. Location, Pacific Coast and Southwestern States. D-296.

ENGINEERING EXECUTIVE desires connection with large industrial concern as assistant general manager or sales engineer. Graduate M. E. Cornell 1909. Seven years' experience in power-plant design, construction and operation; recently mechanical engineer for state industrial commission; at present, Captain, Ordnance Department, assigned as assistant manager to important division. Present position has necessitated close study of organization and equipment of large number of industrial plants. Thorough training in modern business methods, including the selecting and rating of employees; organization and management; sales and advertising; cost finding and accounting practice. D-297.

MANAGER OR SUPERINTENDENT, technical graduate, age 30, married, desires position with well established manufacturing firm. Eight (8) years' experience in electrical and mechanical engineering holding positions requiring executive ability. Good references. Engaged since June 1917 on supervision of artillery ordnance work. Army officer expecting release from service at any time. Will accept position in any desirable locality. Salary $3000. D-298.

MECHANICAL ENGINEER, with 20 years' practical experience in the manufacture of interchangeable parts. For the last ten years successful in handling large organizations on mass production. Only interested in good broad company and one looking for man of that type. At present employed. 42 years old. D-299.

MECHANICAL ENGINEER, technical graduate, employed as master mechanic of large industrial plant in charge of power generation and distribution, maintenance and repair of all mechanical and electrical equipment, and repair shops; two years' drafting and designing. Broad experience with internal-combustion machinery, modern steam turbo-generating plant and mining and milling machinery. Can handle men successfully and produce results to bring costs down to a possible minimum. 34 years old, married. D-300.

PRODUCTION ENGINEER technical graduate mechanical engineering. Qualified to undertake factory management work, to act as production manager or assistant. Experience in modern methods of timekeeping, store keeping, planning, cost finding, wage payment. Now in Government service. Age 28, married. D-301.

MECHANICAL AND CIVIL ENGINEER, four years' experience on railroad, highway and building construction; one year as machinist apprentice; one year in banking business; two years obtaining practical experience in power-station operation; one year as efficiency engineer; one year as mechanical engineer in charge of appraisal of power-plant, 6 months as mechanical engineer in charge of shop design and erection for super-heater concern. Just returned from 14 months' service overseas, Captain Engineers. Graduate C. E. and M. E. Married, age 35. Available April 1. D-302.

FACTORY MANAGER AND ENGINEER, with wide and varied experience in development and up-to-date production of metal goods. D-303.

ASSISTANT MANAGER OR ASSISTANT SUPERINTENDENT of industrial plant, age 43, married, technical graduate; six months concrete inspector in charge for owner; six years

assistant engineer in charge of office, inspecting tunnels and houses, studies laying out completed tunnel line and grade; eight years engineer and chief draftsman in the capacity of production engineer in charge of all contracts to completion, manufacturing pier-shed doors, ferry-bridge machinery, electric-car-barn equipment, etc. Salary to start $3000 per year; location, middle west or south. D-304.

FACTORY EXECUTIVE, MANAGER, SUPERINTENDENT. Age 39, married, technical education, 15 years' practical experience in executive capacities in large factories, industrial, chemical, mechanical; energetic, resourceful, efficient organizer. Reasonable salary. D-305.

EXECUTIVE ENGINEER, mechanical and electrical graduate, age 38, American, with broad experience covering the successful operation for 10 years of electric and heating departments of one of the largest and best-known public utility combinations in the Middle West. Married. Thoroughly familiar with the theory, design, construction and operation of power stations; wide experience in valuations and rate making and possesses managerial ability. D-306.

MECHANICAL INDUSTRIAL ENGINEER, 14 years' experience including the design of automatic machines and other labor-saving devices; development and installation of production and industrial control methods; analysis and solution of industrial management problems; coordination of industrial activities and establishment of written instructions and practices. Initiative, originality, tact. Now employed as assistant to general manager of medium sized organization, but seeking similar position having greater opportunities for advancement. Cornell graduate, 33 years old, married. Minimum salary $4200. Prefer eastern location-ship, New York, Philadelphia, or adjacent territory. Available on two weeks' notice. D-307.

PRODUCTION MANAGER OR ASSISTANT SUPERINTENDENT, technical graduate, age 28, married, discharged from army. Five years' experience manufacturing electrical supplies; thoroughly familiar with scientific management, production systems, wage payment, inspection, handling men, salary $2400. D-308.

EXECUTIVE. Major, Ordnance Department, U. S. A., recently returned from France, and now engaged in important work in connection with the settlement of claims, desires to re-enter commercial life. Experience of 20 years in connection with sales and business promotion with several of the largest manufacturers; over five years of travel in European countries in business developments and studied every phase of foreign trade. Excellent references as to organizing ability, honesty and business ability. D-309.

MECHANICAL ENGINEER, technical graduate, 35 years, married, 10 years' experience on industrial-plant problems, process investigations, experimental and research work on non-oxidizing heat treatment of steel parts and precious metals. Design and construction experience on power plants, gas producers and general mechanical engineering installations; expert designer on structural steel buildings and mechanical equipment. Both office and shop experience. Eastern location preferred. Salary $3000. D-310.

MECHANICAL ENGINEER, with several years of practical experience in steam engine, locomotive and pump works and for the past 17 years as head of department of mechanical engineering at prominent university, desires responsible position either in educational, commercial, or industrial engineering work. Best of references furnished. D-311.

GRADUATE M.E. (Columbia, 1913), Engineer Naval Officer, single, age 29, practical engineer in design and shop problems of power-house machinery and auxiliaries. Prefer engineering sales. Acquaintance in New York City along lines of printing machinery. D-312.

WORKS OR PRODUCTION MANAGER, graduate Stevens Tech., thoroughly versed in scientific management, planning, scheduling and organization methods. Wide experience in manufacturing lines, including war munitions and materials. Would like executive position with well-organized concern. Only high-grade proposition considered. Available within one month. D-313.

NAVAL OFFICER, graduate mechanical engineer, several years' experience general design, construction, and operation mechanical and structural equipment, desires permanent connection with concern engaged in engineering sales, brokerage or exporting business. Highest grade references and credentials furnished. Location preferred, New York City or Philadelphia. D-314.

MECHANICAL ELECTRICAL ENGINEER, experienced in design, construction and operation, purchase of materials for power plant, work heating, steam and electrical distribution, boiler plants and combustion engineering, special reference in large-size steam turbo-generating units. Technical graduate. Can handle men successfully and produce results. Available at once. Age 34, married. Minimum salary $4000 per year. D-315.

INDUSTRIAL OR CHIEF ENGINEER or position as master mechanic with future advancement considered. Age 30, married, desires position. Initiative, possess executive ability, broad experience in design, construction, operation and maintenance of general industrial works, by-product coke plants, gas and chemical plants. Thoroughly familiar with foundation and piling work; selection of proper type, location and construction of masonry and steel buildings, structures of clay and silica fire brick; steam, gas, water and other pipe lines; elevating, conveying and power transmission machinery; machine-shop tools and equipment; pump engines, turbines, compressors, boilers and power-generating apparatus. Have been employed in consulting capacity on design, construction and reconstruction of large industrial properties. Salary $4000 to $4500. D-316.

CHIEF OPERATING OR POWER ENGINEER, technical, practical, 20 years' broad experience operating steam-electric power plants and transmission systems. A good executive and has shown economy in steam generation with low grades of anthracite and bituminous coal. Desires position as chief operating or power engineer for company operating power system, mining property or manufacturing plant. Services available April 1. Salary would depend upon size of plant or responsibilities. D-317.

MECHANICAL ENGINEER AND DESIGNER with years of experience as draftsman and designer of labor-saving devices and experimental work, desires to have work at home from a few industrial plants whose size does not warrant the steady employment of an engineer draftsman. Located in Philadelphia. D-318.

MECHANICAL ENGINEER, with 15 years' industrial-plant maintenance, design, and construction experience with power-plant operating experience wishes to make permanent connection with large industrial or public service company. Thoroughly familiar with purchase of mechanical equipment, fuel combustion, plant organization and efficiency. Accustomed to handling men. Minimum salary, $4000 per year. D-319.

SUPERINTENDENT OF POWER, graduate mechanical engineer with 20 years' broad experience in design, construction and operation of electric-railway and power systems, including interurban railway and high-tension transmission lines. Familiar with latest appliances for effecting economies in operation of steam stations. Trained both mechanically and electrically and as an operating superintendent. D-320.

EXECUTIVE OR SALES ENGINEER about to be released from Government Service, desires to connect himself as executive, sales manager or in similar responsible position where executive ability, combined with engineering and business experience is required. For the past year connected with the Ordnance Department in charge of production of heavy artillery units. Graduate M. E. Massachusetts Institute Technology. Twenty years' experience in engineering and sales work and in manufacturing, both building material and machines. Desires New England (Boston) or New York City location if possible. Best of references can be given. Minimum salary, $5,000. D-321.

MECHANICAL ENGINEER, discharged army officer, 6 years' experience on designs and manufacture of steam specialties, brass and iorn valves of all types, general brass goods; last two years as chief draftsman; married; technical graduate, desires opening where initiative, best efforts and conscientious study will insure a future, location immaterial. D-322.

ENGINEERING EXECUTIVE, returning to the U. S. from France about May 1, desires opportunity to secure permanent position with prospects of advancement. Graduate civil engineer. Experience: railway engineering 5 years, management 8 years, military engineering, 2 years. Entered army as Captain Engineers May, 1917, promoted Lieutenant Colonel Engineers January, 1918. Age 35. D-323.

ENGINEERING EXECUTIVE, for the last 6 years with large industrial corporation handling problems in industrial organization, production, office management, efficiency installations annd department reorganizations. Thorough training in shop practice, machine design, and engineering and office methods. Married; good health. Will go anywhere but prefer location in central Massachusetts or New England in community offering good home and school advantages. Salary to start, $2800, with good opportunity for advancement and chance to later acquire an interest in the business if the engagement is mutually satisfactory. D-324.

ORGANIZER, competent executive, and operating control of management, engineering purchases, production construction. Open for engagement May 1, 1919. D-325.

CHIEF ENGINEER or M. M. of Central Station or Textile Mill. Man with Mass. 1st Engr. License, 18 years' experience in both steam and electrical ends, also machine-shop work on different types of engineering turbo generators, motors, boilers and stokers, in charge and operation. Four years last place as chief and electrical engineer. Can handle help to best advantage, purchase supplies and take general charge. American, 39 years old. Prefer Middle West or South, but will consider other places. State salary. D-326.

GRADUATE MECHANICAL ENGINEER. Desires either an engineering or industrial position; any location acceptable; honorably discharged as 1st Lieut. Infantry; graduate Mass. Inst. Tech. in M. E., June, 1917; 28 years of age, single; over three years industrial experience in the offices and shops of various types of factories. D-327.

WORKS MANAGER, 28 years' experience mechanical and executive, 12 years' executive, filling positions as superintendent and works manager in well-known manufacturing plants. Gas-engine work preferred or small interchangeable manufacturing parts. Well acquainted with alloy steel and heat treatment of same. A-1 man on productive economy and well qualified to equip plants for manufacturing purposes. D-328.

MECHANICAL ENGINEER, desires position as chief engineer or assistant chief engineer where executive experience in handling men and situation is required. Thorough technical training and broad fundamental engineering experience. D-329.

COMPETENT ENERGETIC ENGINEER, offers his services to exporters of machinery or to manufacturing concerns contemplating developments of machine industries in Russia (Siberia) or China. Broad American experience in manufacture of interchangeable product. Best references as to professional and executive abilities. Native Siberian. D-330.

CHIEF DRAFTSMAN. Designing engineer, competent executive, with technical training and broad practical experience in design of machines, tools, fixtures and jigs. Thoroughly familiar with modern methods used in duplicate production. D-331.

GRADUATE MECHANICAL ENGINEER, at present employed, desires change to get with a busy and growing concern, one year power-plant experience, automobile expert; two years purchasing agent of large and small electrical apparatus and all kinds of materials from speci-

fications and drawings. Experienced in making estimates. Good knowledge of general shop practice. Can handle men. Age 25, single. Available April 30, 1919. D-332.

MECHANICAL ENGINEER; Stevens graduate. Age 30, with 8 years' practical experience in coal-gas and ammonia manufacture; mechanical testing; handling technical and sales correspondence in connection with steam specialties, desires as assistant to shop manager or executive. Capable of directing both shop and office work Location, New York City or vicinity preferred, but will consider other localities. Salary, $2500. D-333.

SUPERINTENDENT OR PRODUCTION MANAGER; technical graduate, married, 6 years' experience in manufacturing, production and organization work, thoroughly familiar with modern machine and forge-shop practice; heat treating. Two years Captain Ordnance Department as superintendent in manufacturing plant; location preferred, Middle West. D-334.

PRODUCTIVE ENGINEER; Columbia, 1915, M. E., 3½ years' practical experience in shop and office work; familiar with planning, scheduling, routing and inspecting, desires position offering good opportunity and a reasonable salary, preferably in or around New York City. D-335.

ENGINEERING EXECUTIVE, Member, age 34; commissioned as Captain, promoted to Major in Ordnance Department, on inspection and organization work since the beginning of the war. Previous experience, 12 years' as mechanical engineer, superintendent, and executive with large manufacturing and public utility corporations; now inspection manager and contracting officer for one of the 12 Ordnance Districts in the United States; desires permanent connection with manufacturing or public utility corporation having original problems in organization and business building, and in which tact and resourcefulness in dealing with the public are essential. D-336.

SALES EXECUTIVE. Having sound business, sales, executive and engineering ability desires postition as manager of sales and advertising or as sales engineer in charge of important territory. Would consider commission arrangement with high-grade concern in good location. Thoroughly familiar with Canadian market. D-337.

MECHANICAL ENGINEER, desires position as assistant engineer with industrial concern. Technical graduate, age 24, 3 years' experience machinery design, layouts and general mill construction. Present salary $2000 per year. D-338.

TECHNICAL GRADUATE, B. S. and E. E., age 31, married, at present employed as assistant to power superintendent of large industrial plant, desires position of greater responsibility where reward will be commensurate with success of his work. Can handle men, and experienced in central-station work, powerhouse design, construction and operation, with some experience with steam and hydraulic equipment. Can furnish referenc from present employer and will go anywhere but tropics. Correspondence invited. D-339.

SUPERINTENDENT OR WORKS MANAGER. American, 16 years' practical experience in large organizations, filling positions as apprentice machinist, tool maker, tool designer, chief engineer, assistant works manager, and at present mechanical superintendent in large manufacturing plant employing 3000. Having been successful in organizing factory and engineering departments and introducing up-to-date manufacturing methods for small and medium interchangeable parts, such as phonographs, electrical instruments, sewing machines, ets. Can make an interesting proposition to special or automatic-machine manufacturers, who are contemplating adding new line of machines to their product. D-340.

MECHANICAL ENGINEER, 24 years' experience (since graduation) in design and construction of heavy hoisting and conveying machinery, in power-plant design, and in steam-engineering research. Desires position requiring executive ability and skill in dealing with people as well as technical knowledge. Major, Ordnance Department, U.S.A., for past 16 months. Can secure release about April 30. D-341.

MECHANICAL ENGINEER; Captatin of Engineers, U. S. Army, recently discharged; age 31, married; desires to secure position as superintendent or executive. Have had 8 years' experience in organization and handdling sale of steel products, also experienced in manufacture of machine and hammered forgings of all kinds and heat treating operations. Salary, $3000, with opportunity for advancement. Prefer Middle West location. D-342.

INDUSTRIAL ENGINEER, age 31, married; 16 years' of practical manufacturing experience, special knowledge on investigation organization, standardization, time study and factory costs. Familiar with up-to-date shop practices; available at once; location immaterial; salary, $3000. D-343.

MECHANICAL ENGINEER, technical graduate, age 31. Has had broad experience in design and construction of refrigeration and sugar machinery and methods of production control. Held commission in Ordnance Department fer a year, being in charge of industrial engineering work at one of the largest and up-to-date manufacturing shops in the country. Desires executive position in manufacturing or engineering concern. D-344.

ASSISTANT PROFESSOR, mechanical and electrical engineering, desires advancement; 3 years' practical work, 5 years in responsible college positions both laboratory and lecture. Specially experienced in gas engines and power-plant practice. D-345.

EXECUTIVE ENGINEER OR ASSISTANT MANAGER. Graduate electrical and mechanical engineer, age 30; experienced in power-plant and sub-station construction, operation and maintenance; organization; appraisal engineering; steel-mill operation and machine-shop practice. Having executive ability and can handle men. Recently released from active service as Lieutenant, U. S. N., as an engineer officer in the battleship fleet. Desires position as executive engineer or assistant manager where there is opportunity for advancement. Salary, $3600 to $4000. New York or Eastern location preferred. D-346.

TECHNICAL GRADUATE, 1915, in mechanical engineering, desires position along executive lines; 3 years' experience in shop and drawing room; 27 years' of age and married. At present Ensign in the Naval Reserves, and desires to locate in the East. Minimum salary, $2000. D-347.

EXECUTIVE ENGINEER, with experience in production, mechanical and executive positions in manufacturing and chemical plants. Age 34, married, technical graduate and have been connected with the larger corporations of the country. D-348.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER APRIL 18

BELOW is a list of candidates who have filed applications since the date of the last issue of THE JOURNAL. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 179.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by April 18, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

Alabama

CASPER, JAMES M., Master Mechanic, Woodward Iron Company, Woodward
MCCAGHREN, JOHN R., Mechanical Engineer, Crane Company, Birmingham
MILLER, EUGENE A., Chief Draftsman, Fairfield Works, T. C. & I. R. R. Company, Birmingham

California

BUMSTED, E. BRADFORD, Consulting Engineer, San Francisco
FENTON, JOHN H., Lieutenant, U. S. N., Sacramento
FOULDS, CHARLES V., Erecting Engineer, Pelton Water Wheel Company, San Francisco
GRIFFITH, EARL G., General Manager, The Conveyor Co., Los Angeles
HICKMAN, MILLARD R., Marine Erecting Engineer, Westinghouse Electric & Manufacturing Company, San Francisco
SAXE, WALTER E., Chief Engineer, The Conveyor Company, Los Angeles
STUEWE, LEONARD, Mechanical Draftsman, Standard Oil Company, El Segunda
TAYLOR, GEORGE E., Chief Draftsman, Meese & Gottfried Company, San Francisco

Colorado

BROOKS, PAUL E., Mechanical Engineer, Cripple Creek & Colorado Springs R. R., Colorado Springs
DENTON, GILBERT H., President & Manager, The Vulcan Iron Works, Denver

Connecticut

COBB, DEAN B., Head of Drafting Department, Boardman Trade School, New Haven
CRUDGINTON, ROBERT F., Mechanical Engineer, East & West Plants, Columbia Graphophone Company, Bridgeport
GALLAGHER, EDWARD B., Treasurer, Clover Manufacturing Co., Norwalk
HERR, BENJAMIN F., Designer, Winchester Repeating Arms Company, New Haven
PEPPEL, JOSEPH S., Superintendent, Pressed Metal Division, The American Tube & Stamping Company, Bridgeport
RICHMOND, OSCAR J., Chief Engineer, The United Illuminating Company, Bridgeport
ROCKWELL, STANLEY P., Captain, Ordnance Department, U. S. A., Colt's Patent Fire Arms Manufacturing Company, Hartford

Delaware

DAY, THURMAN O., in Mechanical Experimental Division of Engineering Department, E. I. du Pont de Nemours & Company, Wilmington
MURPHY, CLARENCE A., Assistant Chief Engineer, Hercules Powder Company, Wilmington
WATTS, JAMES R., Chief Engineer, American Mang. Steel Co., Plant "C," New Castle

District of Columbia

ROBBINS, JOHN F., Mechanical Engineer, Bureau of Steam Engineering, Navy Department, Washington
SCHEIBEL, ALBERT H., Mechanical Engineer, Construction Division, War Department, Washington
SCHNEIDER, CARL, Superintendent of the Mechanical Plant, U. S. Bureau of Standards, Washington
STARRETT, WILLIAM A., Colonel, U. S. A., War Industries Board, Washington
VINING, MERRITT A., Bureau of Steam Engineering, U. S. N., Washington

Illinois

ADAMS, CAMPBELL V., Designing Engineer, Link Belt Company, Chicago
GILLETTE, EDMOND S., Electrical & Mechanical Engineer, Aurora, Elgin & Chicago, R. R. Company, Aurora
KEIG, MARSHALL E., Secretary and Treasurer, Harry Vissering & Co., Chicago
SHAPIRO, ABRAHAM, Production Engineer, Universal Stamping & Manufacturing Company, Chicago

Indiana

FISCHER, CARL C. J., Designer, Nordyke & Marmon Company, Indianapolis
TITUS, WILLIAM J., Consulting Engineer, Indianapolis

Iowa

DRABELLE, JOHN M., Mechanical & Electrical Engineer, Iowa Railway & Light Company, Cedar Rapids
LOONEY, JULIAN L., Mechanical Engineer, Globe Machinery & Supply Company, Des Moines

Kansas

BUCK, CHARLES P., General Manager, Perfection Metal Products Company, Topeka

Massachusetts

BESSE, SEITH J., Assistant Manager, Morse Twist Drill & Machine Company, New Bedford
BEVAN, PAUL A., Production Engineer & Engineer of Tests, Ordnance Department, U. S. Cartridge Co., Lowell
BUTLER, HARRY M., Mechanical Engineer, Union Twist Drill Company, Athol
BUTLER, JAMES A., Experimental Engineer, Treasurer, Butler & Hayes, Incorporated, Boston
CHIPMAN, FRED W., Treasurer & General Manager, International Engineering Works, Incorporated, Framingham
FLANDERS, CHARLES E., Mechanical Engineering Assistant, Watertown Arsenal
GOODALE, WILLIAM P., Temperature Engineer, C. J. Tagliabue Manufacturing Company, Boston
HAYDEN, WILLIAM R., Head of Production Department, Bailey Meter Company, Boston
HILL, HARRY E., Engineer, H. P. Hood & Sons, Charlestown
INMAN, ALBERT H., Steel Merchant, Partner, Pratt & Inman, Worcester
KATZ, ALFRED, Safety Engineer, Ludlow Manufacturing Associates, Ludlow
KNEELAND, RALPH P., Master Mechanic, Machinery Division, U. S. Navy Yard, Boston
MACNIVEN, FRANK R., 1st Lieutenant, Ordnance Department, U. S. A., Springfield Armory, Springfield
READ, WILLIAM T., Purchasing Agent, Morse Twist Drill & Machine Company, New Bedford
WEBSTER, ARTHUR G., Professor of Physics, Director of Ballistic Institute, Clark University, Worcester
WOOD, FREDERICK E., Factory Layout Assistant, Hendee Manufacturing Company, Springfield

Michigan

BERRY, CHARLES H., Techincal Engineer, Steam-Electric Central Station Work, Detroit
FLETCHER, HENRY E., General Manager, Fletcher Paper Company, Alpena
FLINT, FARRISH T., Production Engineer, Lincoln Motor Company, Detroit
FRIEDLANDER, I. LEO, Maintenance Engineer, Detroit Pressed Steel Company, Detroit
GRASSI, CHARLES, General Foreman, Lincoln Motor Company, Detroit
KNAUER, EBERT, Chief Tool Designer, Burroughs Adding Machine Company, Detroit
MAURER, EDWIN R., Shop Superintendent, The Solvay Process Company, Detroit
PARMENTER, OTTIE A., American Seating Company, Grand Rapids
VAIL, RALPH A., General Superintendent, Dodge Brothers, Detroit
WHALEN, JOSEPH P., Engineer of Materials, Ordnance Department, U. S. A., Detroit

Nevada

RHOADS, ROBERT L., 2nd Lieutenant, T. C. U. S. A., McGill

New Hampshire

ABBOTT, WILLIAM G., JR., Consulting Engineer, Wilton

New Jersey

DAVIS, EDWARD, Superintendent, Edison Phonograph Works, West Orange
DEKUZELEWSKI, ADALBERT R., Production Manager, Irvington Manufacturing Company, Irvington
FLEMING, HART H., Combustion Engineer, Standard Oil Company, Elizabeth
MCCALLUM, JAMES R., Chief Engineer, Truck and Traction Dept., Militor Corporation, Jersey City
MARSHALL, JOHN G., Draftsman, Safety Car Heating & Lighting Company, Jersey City
MEALS, ARTHUR D., Engineering Department, U. S. N. R. F., Steam Engineering School, Stevens Institute of Technology, Hoboken
PRICE, GEORGE E. JR., General Purchasing Agent, Davis Bournonville Company, Jersey City
RIGNEY, F. GERALD, Chief Army Inspector, Ordnance Department, U. S. A., Kraenter & Company, Incorporated, Newark
TOOMEY, THOMAS C., Checker, Babcock & Wilcox Company, Bayonne
TRIPP, WILLIAM A., Assistant Chief Draftsman, Babcock and Wilcox Company, Bayonne
WILLS, E. COOPER, Superintendent of Works Manager, Nagle Steel Company, Rahway

New York

ADAMSON, CLARENCE H., 2nd Lieutenant, Chemical Warfare Service, Gas Defense Plant, Long Island City
ADOLPH, WALTER J., Mechanical Designer, Sperry Gyroscope Company, Brooklyn
AHLERS, WALTER C., Ensign, Brooklyn
BAILLIE, ROBERT B., Assistant Inspector of Engineering Material, U. S. Navy, Brooklyn
BALKO, GEORGE A., Second Assistant Engineer, U. S. S. Hickman, Brooklyn
BRUCKNER, ARTHUR, Assistant Professor of Mechanical Engineering, The College of the City of New York, New York
BUCKENHAM, ARCHIBALD. G., Engineer, Angus Hopkins, New York
BUCKMASTER, BEN S., Ensign, Engineering Office U. S. N. Gas Engine School, Columbia University, New York
CARROLL, JAMES B., Ensign, U. S. N. R. F., Massena
COMSTOCK, HARRY, General Superintendent, Witherbee, Sherman & Company, Incorporated, Mineville
DAWES, LYMAN M., Plant Engineer, Watervliet Arsenal, Watervliet
EDWARDS, LEROY V., Cost Estimator, William Vogel & Brothers, Incorporated, Brooklyn
EMERSON, ALBERT, Lubricating Engineer, Vacuum Oil Company, New York
EVERITT, F. C., Consulting, Industrial & Production Engineering, Miller, Franklin, Basset & Company, New York
FITZGERALD, RICHARD, Production Engineer, National Conduit & Cable Company, Hastings-on-Hudson
FLEER, ROBERT J., Ensign, U. S. N. R. F., Brooklyn
GEHMAN, LLOYD E., Operation Layout Engineer, Wright-Martin Aircraft Corporation, Long Island City
GEIGER, HERMAN R., Mechanical Engineer, New York
GILES, GEORGE S., Ensign, U. S. N. R. F., Office of Superintending Constructor of Aircraft, U. S. N., Buffalo
GROSHOLZ, RICHARD, Ensign, U. S. N. R. F., U. S. S. Hickman, New York
HANLEY, JOHN H., JR., New York Representative, E. B. Badger & Sons Company, New York
HOBART, HAROLD P., Assistant to Inspection Manager, New York District Ordnance Office, New York
JOSEPHS, LYMAN C., JR., Engineer, International Motor Company, New York
LEGGE, WALTER G., Sales Engineer, The Permutit Company, New York
MCNEAL, THOMAS C., Draftsman & Designer, Curtiss Engineering Corporation, Garden City
MERRILL, DONALD G., Draftsman, Watervliet Arsenal, Plant Engineering Office, Watervliet
MOLONEY, WILLIAM J., Plant Manager, Hart & Crouse Company, Utica
NEAL, JOHN F., Erecting Engineer, Kerr Turbine Company, Wellsville
NEFF, LAMBERT G., S. A. Potter Tool & Machine Works, New York
REARDON, MICHAEL F., Sales Agent, General Electric Company, New York
SMITH, GEORGE P., JR., Supervising Inspector, Air Nitrates Corporation, New York
SMITH, HENRY S., Chief Engineer, Prest-o-lite Company, New York
SMOOT, CHARLES H., Engineer and Vice-President, Rateau Battu Smoot Company, New York
STEVENSON, ROBERT L., Mechanical Engineer, Russell Motor Company, Buffalo
THRALL, EDWIN F., Ensign, Engineer Officer, U. S. N., New York
WATT, ROLAND M., Ensign, U. S. N. A. R. Headquarters, New York
WINTERS, FRANK J., JR., Chief Draftsman, The Iron Age Publishing Company, New York
YATES, HARRY A., Reserve Engineer, The Barrett Company, New York

Ohio

ARCHEA, WALTER D., Designing Engineer, The Cincinnati Milling Machine Company, Cincinnati
BURGER, WILLIAM J., Assistant Superintendent, Charge of Engineering Department, The Warner & Swasey Company, Cleveland
BURRELL, EDWARD P., Works Manager, The Warner & Swasey Company, Cleveland
CARPENTER, GEORGE D., Chief Engineer, Davis Sewing Machine Company, Dayton
DODGE, ARTHUR C., Manager, Fairbanks, Morse & Company, Cincinnati
GALLOWAY, JAMES W., Designer, War Department, Airplane Eng. Division, McCook Field, Dayton
GLOSH, F. P., Designer, Cincinnati Planer Company, Cincinnati
MOSLER, HENRY G., Secretary, The Mosler Safe Company, Hamilton
MURDOCH, MARSHALL C., Experimental Engineer, Aluminum Castings Company, Cleveland
MYERS, CARL O., Chief Inspector of Steam Boilers, The Industrial Commission of Ohio, Columbus
ROCHE, MAURICE F., Lieutenant, Superintendent Ordnance Department, U. S. A., Cincinnati
STANION, THOMAS, Manager, Safety & Sanitation, The Aluminum Casting Company, Cleveland

Oklahoma

DAAMS, LUCAS, Refinery Construction Engineer, Roxana Petroleum Company of Oklahoma, Tulsa
GILMORE, FORREST E., Structural Engineer, Frank Peterson & Company, Tulsa
SHALLENBERGER, GEORGE G., Assistant to the President, Marland Refining Company, Ponca City

Oregon

BUKOWSKY, HARRY E. W., 1st Lieutenant, Coast Artilery Corps, U. S. Army, Portland

Pennsylvania

BANNISTER, BRYANT, Power Engineer, National Tube Company, Pittsburgh
BASCOME, GEORGE L., Chief Engineer, United Service Company, Scranton
BUSE, HAROLD P., Ensign, U. S. N. R. F., Naval Overseas Transportation Service, Philadelphia
CLARKE, FRED F., Chief Engineer, Colburn Machine Tool Company, Franklin
COVERT, EDSON C., Contracting Engineer, Heyl & Patterson, Incorporated, Pittsburgh
CRARY, HARRY S., Assistant General Manager, John B. Semple & Company, Sewickley
FISHER, WILLIAM J., Superintendent, A. B. Farquhar Company, Limited, New York
FULLERTON, ALEXANDER W., Purchasing Agent, Westinghouse Electric & Mfg. Co., Lester
GRISWOLD, MATTHEW, JR., Works Manager, General Electric Company, Erie
HEWITT, D. EDMUNDS, Assistant to Superintendent Buildings & Grounds, University of Pennsylvania, Philadelphia
IRMER, CHARLES B., JR., Ensign, U. S. N. R. F., Philadelphia
LLOYD, NICHOLAS P., Assistant to President, Newton Machine Tool Works, Incorporated, Philadelphia
MCCONNEY, MERLE S., Mechanical Superintendent, Naval Aircraft Factory, Philadelphia

MOORE, WILLIAM N., Chief Draftsman, Gauge Department, Frankford Arsenal, Philadelphia
NEWMAN, SAMUEL F., Superintendent, Landis Machine Company, Waynesboro
O'TOUSA, MICHAEL, Machine Designer, National Tube Company, Elwood City
OWINGS, ROGER B., Maintenance Engineer, Eastern Laboratory, du Pont Company, Chester
PURCELL, JOHN P., Assistant Superintendent of Erecting Department, Baldwin Locomotive Works, Eddystone
REED, MACDONALD S., Chief Engineer, Crane Department, Erie Steel Construction Company, Erie
REMMERS, HENRI L. W., Mechanical Engineer, The Barrett Company, Philadelphia
STEVENSON, GEORGE A., Charge of Shipfitting Up Department, Traylor Shipbuilding Corporation, Cornwells Heights
WEST, HARRY J., Superintendent, Gautier Department, Cambria Steel Company, Johnstown
WILTSIE, SPENCER A., Engineer on Inspection and Maintenance of Tools, Erie Forge Company, Erie

Rhode Island

MOSES, FREDERICK W., President, Firearms Mutual Insurance Company, Providence

South Carolina

HARRINGTON, CARLIN F., Sergeant, Headquarters Company, 49th Infantry, Camp Jackson

Tennessee

MORGAN, DANIEL, Army Chief Inspector, Southern Machine Company, Chattanooga
WOOLRICH, WILLIS R., Assistant Professor of Mechanical Engineering, University of Tennessee, Knoxville

Texas

TROUT, WALTER C., Secretary & Manager, Lufkin Foundry & Machine Company, Lufkin

Virginia

COLEMAN, FRANCIS T., Inspector, Material Department, N. N. S. & D. D. Company, Newport News
HIEBELER, HARRY G., Marine Draftsman, Newport News Shipbuilding & Dry Dock Company, Newport News

Wisconsin

ZWALLY, EARLE L., Road & Experimental Engineering, Mitchell Motors Company, Racine

Canada

WATTS, WALTER A., Superintendent of Experimental Department, Massey-Harris Company, Limited, Ontario

Norway

KAHRS, OTTO, President, Otto Kahrs Kammanditaktieselskab, Kristiania

Scotland

YARROW, HAROLD E., Managing Director of Messrs. Yarrow & Company, Glasgow

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE

New Jersey

REIFSNYDER, JAMES D., Vice-President & General Manager, New Jersey Machine Corporation, Hoboken

Pennsylvania

HATHAWAY, H. K., Consulting Engineer, Philadelphia

PROMOTION FROM ASSOCIATE MEMBER

California

ROOT, HAROLD D., Mechanical Engineer, The Luitwieler Pumping Engine Company, Los Angeles

District of Columbia

HERSEY, MAYO D., Physicist, Bureau of Standards, Washington

Montana

BALLOU, F. H., Engineering Department, The Great Western Sugar Company, Billings

Pennsylvania

FULLER, FLOID M., Lieutenant, U. S. N. R. F., Assistant Inspector of Ordnance, Bethlehem Steel District, South Bethlehem

Cuba

CUERVO, MANUEL V., Member of Firm, Cuervo y Pagliery, Havana

PROMOTION FROM JUNIOR

Alabama

KIRK, DONALD, Estimator for Chickasaw Shipbuilding Company, Mobile

District of Columbia

PHILLIPS, LEON S., Captain, Advisory Engineer, Refrigeration, Construction Division of the Army, Washington

Massachusetts

REED, E. WINSON, Reed & Prince Manufacturing Company, Worcester

New York

MCARDELL, WESLEY E., Teacher of Mathematics and Machine Shop Practice, Vocational School for Boys, New York
ZARRISKIE, WILLIAM H., Assistant Superintendent, Standard Oil Company of New York, Long Island City

Ohio

BRETT, ROY C., Instructor in Mechanical Engineering, Case School of Applied Science, Cleveland
LUEHRS, DANIEL M., Consulting Engineer, (Reinstatement), Cleveland

Pennsylvania

BRUBACK, THEODORE M., Chief Engineer, Vulcan Soot Cleaner Company, Du Bois

SUMMARY

New Applications	164
Change of Grading	
Promotion from Associate	2
Promotion from Associate Member	5
Promotion from Junior	8
Total	179

SUMMARY SHOWING AVERAGE AGE AND POSITIONS OF APPLICANTS ON BALLOT FEBRUARY 28, 1919

Average age of applicants:	
Members	40
Associates	36
Associate-Members	33
Juniors	26
Administrative Engineer	1
Aeronautical Engineer	1
Chief Engineers	9
Consulting Engineers	6
Construction Engineer	1
Contracting Engineer	1
Designers	8
Draftsmen	10
Chief Draftsmen	6
Asst. Chief Draftsmen	3
Electrical Engineer	1
Engineers of Tests	2
Estimator	1
Executives (Pres., Vice-Pres., Secy., Treas., Mgrs.)	33
Foremen	4
Field Engineer	1
Industrial Engineers	2
Inspectors	3
Instructors	3
Master Mechanics	3
Mechanical Engineers	25
Asst. Mechanical Engineers	8
Planning Engineer	1
Plant Engineers	2
Power Engineer	1
Asst. Production Engineer	1
Asst. Professor	1
Asst. Resident Engineer	1
Sales Engineers	3
Sales Managers	2
Superintendents	15
Asst. Superintendents	3
Supervisor	1
Works Engineers	2
Miscellaneous	38

UNITED STATES GOVERNMENT SERVICE

Lieut. Col.	1
Major	3
Captain	9
1st Lieut.	10
2nd Lieut.	4
Ensign	1

Pay the Price of Victory—
Buy Victory Bonds!

In Two Sections—Section Two

Volume 41 Number 5

MECHANICAL ENGINEERING

THE JOURNAL OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

May, 1919

Society Affairs

A Record of the Current Activities of the Society, Its Members, Council, Committees, Sections and Student Branches; and Affairs of Interest to the Membership

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
29 West 39th Street, New York

Coming Meetings

Plan to attend the Spring Meeting! To be held at Detroit, June 16 to 19, with Headquarters at Hotel Statler. Full particulars in Section I of this issue of MECHANICAL ENGINEERING, page 483.

May 5: The Minnesota Section will hold its regular monthly meeting at the St. Paul Association of Commerce, speaker and subject to be announced later.

May 14: A meeting of the New Branch of the Connecticut Section is scheduled.

May 16: St. Louis Section meets at the Hotel Statler.

May 27: The members of the Philadelphia Section will hold a business meeting in the Engineers' Club.

Fuel Conservation will be the subject of a meeting to be held in May by the Worcester Section, at the Hotel Bancroft, on a date to be announced later. The paper to be presented at this meeting will be delivered by John F. Tinsley.

Excursion to Spring Meeting

Including Visits to Buffalo and Cleveland, Entertainment and Side Trips at These Stops, Thence by Lake Steamer to Detroit via Put-in-Bay. Decide *now* to go and take advantage of this opportunity for a delightful Inland Sea Voyage—"In All the World no Trip Like This"

THE fact that the Spring Meeting this year starts on Monday gives an unusual opportunity to arrange an excursion en route over the week end, via rail and lake steamer.

Special cars from Boston, Providence, Worcester, Connecticut, New York, Philadelphia, Baltimore, Pittsburgh, Cincinnati, Indianapolis, Erie and Toronto, under the auspices of the Section or local society, will make it possible for members to assemble at Buffalo and Cleveland and spend Saturday night and Sunday together on one of the large modern steamers on Lake Erie.

Reduced fares will be possible because of the number traveling together.

The Buffalo Section A. S. M. E. will arrange special excursions, and other entertainment on Saturday the 14th, and the Cleveland Section has arranged to hold a meeting on Saturday, June 14th, which members on the way to the Spring Meeting are invited to attend.

ITINERARY

Via Buffalo. Special cars and trains will leave Friday, June 13, from New England points, New York, Washington, Baltimore and Philadelphia, arriving at Buffalo Saturday morning. The Buffalo Section will meet the party with automobiles and provide entertainment with excursions throughout the day, affording opportunity also for special side-trips such as Gorge Route, Niagara Falls. Leave by lake steamer at 7:00 p.m., arriving at Cleveland Sunday morning at 7:00 a.m., where the party will join with those going

Via Cleveland. Special cars and trains will leave Philadelphia, Baltimore, and Washington, Pittsburgh, Cincinnati, Indianapolis, New England points and New York, Friday evening, arriving at Cleveland Saturday morning. Automobiles will meet the various trains, taking the parties to the Chamber of Commerce where an all-day convention of A. S. M. E. Cleveland Section will be held. Headquarters of visitors will be at the new Hotel Cleveland on the Public Square, convenient to the Chamber of Commerce Building. There will be a luncheon followed by an excursion to points of interest and a dinner meeting. Sunday morning the party will join the Buffalo contingent en route to the Spring Meeting going

Via Put-in-Bay. The boat will stop at Put-in-Bay where an auto ride will be taken and dinner served, the boat leaving at 3:30 p.m. for Detroit and arriving there at 7:00 p.m. Automobiles will be provided to hotels.

Those who participate in this excursion will not only have an enjoyable trip but will arrive at Detroit acquainted with a number of people attending the Spring Meeting and will find their general interest in the entire convention thereby greatly enhanced.

YOUR PART

Before anything can be accomplished in arranging details and developing this plan, however, it is necessary to know approximately how many persons will participate. Without obligating yourself in any way, therefore, please fill out and mail at once the Reply Blank below. These replies will make it possible to develop the ideas submitted herewith, make tentative reservations for steamer accommodations, etc. A second notice regarding this excursion will be issued to the membership early in May giving further information.

A.S.M.E., 29 West 39th St., New York.

Without obligating myself I am furnishing the following information to enable plans for an excursion to the Spring Meeting to be developed:

I expect to attend with { ....lady / ....gentleman } guests, and will require { ....upper berth .... section / ....lower berth .... drawing room }

in Pullman sleepers from ..... to { Buffalo / Cleveland } and { ....upper berth / ....lower berth..stateroom for 2 }

from { Buffalo / Cleveland } to Detroit. I { will / will not } attend Spring Meeting at Detroit, but will go direct to Detroit. I would like to go with the ..... Section.

Name .....

Street and No..... Town and State.....

SOCIETY AFFAIRS

Affairs of Interest to the Membership—Secretary's Letter—Council Notes—Committee on Aims and Organization—Meetings of Local Sections—Employment Bulletin—Candidates for Membership

The Secretary's Letter

DR. NICHOLAS MURRAY BUTLER, President of Columbia University, in Education after War (*Educational Review*, January 1919), says:

> The war has taught the lesson that the proper place of efficiency is as the servant of a moral ideal, and that efficiency apart from a moral ideal is an evil and a wicked instrument which in the end can accomplish only disaster.

President Horace V. Winchell, of the American Institute of Mining and Metallurgical Engineers, in accepting office, said (*Bulletin* of the American Institute of Mining Engineers, March 1919):

> Let us feel some responsibility for the condition of Society, let us individually and through our Institute and kindred organizations * * * * seek means by which we may increase our moral efficiency, improve the relations between the citizen and the government, between the employer and the employed, and so add to the sum of human happiness.

Spencer Miller, Vice-President of this Society, at the meeting of the New York Section, March 26, said:

> Who won the war? What won the war? Surely it was not material things, for the war was going against us with the same amount of material. The answer to the riddle is the same that Napoleon announced one hundred years ago: "The relation of morale to materials of war is as three to one." And Marshal Foch only last week said, "Faith won the war." Both faith and morale are things of the spirit. If the stuff of victory at arms is largely a thing of spirit, why is it not also true of any victory in engineering? Don't you all know that your greatest engineering victories are more traceable to perseverance, industriousness, good habits, courage, pluck, steadfastness, than they are to simple engineering training as such? Is it not the spirit after all that wins all victories?
>
> If the Engineer finds that in the complete fulfillment of his life work about one-quarter is material and the remainder spiritual, should not engineering societies make adequate recognition of this important fact? Is not morale as important to the engineer as to the soldier? Is not morale as important to an engineering association as it is to a military division? If these facts are conceded, then can we refuse to give the fullest and most complete consideration to the development of these traits among engineers?

Glenn Frank, in a paper on Anonymous Liberalism in the April *Century*, under a sub-caption "The earmarks of a profession," said:

> First, a professional career requires a preliminary attainment of knowledge, and in some measure of learning, as distinguished from the mere skill that comes from administrative experience.
>
> Second, a professional career implies a sense of public function looking toward the accomplishment of certain social objectives as the final justification of any claim to public respect and support.
>
> Third, a professional career involves adherence to a code of professional ethics.

President Thomas Kimball, of the American Institute of Architects, will voice in his address before the annual meeting of the Institute this month even more advanced ideas.

The Secretary for years has felt these sentiments but has not had the power of eloquent expression of the leaders whose words he has just quoted. In so far as he is the executive of the Society, he has conceived it to be his function to make the organization serve society and the profession, not for the love of serving, since even this would be selfish, but only for the common good. Only thus may the Society attain its highest efficiency.

The Secretary has this month completed his third trip since the beginning of the year, and has visited practically every portion of the United States where we have members. In every place he has emphasized the fact that the trip is evidence of the great interest taken in the members by the President and Council and Sections Committee. He has construed it to be his opportunity to give the above message, and it is no exaggeration to say that it has been received enthusiastically in every city. Often the gathering has been the greatest in numbers as well as in representative capacity ever held in the history of any particular city. This is an evidence of the fundamental ideals which the American people hold at this time, accentuated obviously by the Engineer-Citizen.

While the trip was primarily for the purpose of visiting the membership and Sections of the Society, and bringing to them the above-mentioned message, nevertheless, in every city two meetings were uniformly arranged, one of the A. S. M. E. members, and one joint meeting of all the professions, including architects, chemists, geologists, etc.

The particular task placed upon the members of the technical professions is that of taking part in those features of public undertakings which are admittedly engineering or technical, e.g., the straightening of the Cuyahoga River through the City of Cleveland (Cleveland Engineering Society); flood control of Los Angeles County (Southern California Association of members of the A.S.C.E.); the $23,000,000 municipal bond issue of St. Louis, most of which is for engineering projects. (Associated Engineering Societies of St. Louis), etc., etc.

In case any one thinks the first part of this letter savors too much of the ideal, he nevertheless cannot fail to see that service of the engineer-citizen to the community in which he lives is sufficiently realistic to tax all the abilities of the members of our profession.

CALVIN W. RICE,
Secretary.

Council Notes

At the meeting of the Council held in New York on March 27, the following were present: M. E. Cooley, *President*, in the Chair, *Past-Presidents*, Ira N. Hollis, D. S. Jacobus, Charles T. Main and Jesse M. Smith (also *Chairman Committee on Constitution and By-Laws*); *Vice-Presidents*, John Hunter, Fred R. Low, Spencer Miller, Henry B. Sargent; *Managers*, Robert H. Fernald, William B. Gregory, Charles Russ Richards, Frank O. Wells; *Treasurer*, William H. Wiley; *Committee Chairmen*, W. E. Symons, *Finance;* D. S. Kimball, *Meetings and Program;* S. D. Collett, *Membership;* and W. E. Bullock, *Assistant Secretary*.

Reports of progress were received from the chairmen of the Standing Committees of Administration present.

Standardization. Mr. J. H. Barber, introduced by Mr. C. le Maistre, Secretary of the British Engineering Standards Association, outlined the work of the Association and e pressed its hope for close coöperation in order to promote Anglo-American standardization in engineering matters.

The following standards presented by the American Society for Testing Materials to the American Engineering Standards Committee were reported:

Method of Sampling Coal
Standard Specifications for Drain Tile
Standard Method for Distillation of Bituminous Materials Suitable for Road Treatment
Standard Test for Roughness of Rock
Standard Test for Penetration of Bituminous Materials.

Power Test Codes. Mr. Low, Chairman, reported the first quarterly meeting on March 3, of the Committee.

On the recommendation of this Committee, Milton C. Stuart, Mem.Am.Soc.M.E., was appointed on the new Committee on Condenser Units and Feed Water Heaters; George E. Rhoads, Mem.Am.Soc.M.E., and J. McB. Snodgrass, Mem.Am.Soc.M.E.,

were appointed on the Locomotive Code Committee; F. G. Cutler, Mem.Am.Soc.M.E.; C. R. Waller, Mem.Am.Soc.M.E.; S. B. Redfield, Mem.Am.Soc.M.E., and J. C. Bacon were appointed on the Committee on Centrifugal and Turbo Compressors.

Recommendations that the Council invite the Railway Master Mechanics Association to appoint a representative on the Locomotive Code Committee and the Hydraulic Society a representative on the Committee on Centrifugal and Rotary Pumps were approved.

Committee on Relations with Colleges. A new committee to embrace the old committees on Student Branches and on Junior Prizes was created, consisting of Ira N. Hollis, Chairman, William B. Gregory, John R. Allen, J. W. Roe and Guido H. Marx, Members of the Society.

This committee will also report on Awards of Merit by the Society.

Nominating Committee. Alexander G. Christie, Baltimore; H. J. Hinchey, Atlanta; Theo. H. Hinchman, Detroit; J. V. Martenis, Minneapolis; Robert Sibley, Berkeley, Cal., were announced by the President as the regular Nominating Committee for 1919.

Rehabilitation of the Blind. The President announced the following committee to coöperate with the Red Cross Institute for the Blind and other agencies in assisting in the design of special apparatus for the use of the blind, particularly blind soldiers: C. H. Benjamin, J. D. Hoffman, E. H. Ahara, R. Anderson, T. P. Eagan, C. S. Gingrich, F. E. Sanborn, F. H. Sexton, L. W. Wallace.

American Society of Refrigerating Engineers. The exchange of courtesies with this society was approved, their name to be printed on the introduction card. The address of the society is 154 Nassau Street, New York City.

Commercial Engineering Conference. The President was empowered to appoint a representative to this conference by the Bureau of Education in Washington, March 31. This conference is being called for the purpose of discussing the question of introducing commercial-engineering subjects into engineering curricula.

Engineering Council. Suggestions of coöperation of the Society in the establishment of a personnel laboratory for the study of general employment problems and also concerning improvements in conditions for engineers in the employ of the Government were referred to this body, as also was a recommendation on legislation dealing with the registration of engineers.

National Industrial Conference Board. The President reported that in accordance with previous action of the Council, he would associate with himself L. E. Strothman, Mem.Am.Soc.M.E., Milwaukee, Wis., to represent the Society in its purpose to take membership in this Board.

War Service. The President was authorized to appoint a Committee on the History of the Society's Participation in the World War and to act also as a committee on a Memorial to those members of the Society who have died in the service of their country.

Representation. The report of the Society's representatives at the meeting of the National Society for Vocational Education in St. Louis was received.

Franco-American Engineering Committee. W. F. Durand, J. W. Lieb and Peter Junkersfeld, Members of the Society, were announced as the Society's representatives on a committee to be appointed by the national engineering societies to work with a similar committee of French engineers as recommended in report of the American Engineering Commission to France, on which this Society was also represented.

This committee will also act as a Reception Committee to a delegation of French railway engineers who are to visit this country, and J. W. Lieb, Charles T. Main and E. B. Katte, Members of the Society, were announced as a New York Reception Committee to these engineers.

Adjournment was taken to meet in New York on April 18.

CALVIN W. RICE,
Secretary.

The Committee on Aims and Organization

The following communications dealing with matters now under consideration by the Committee on Aims and Organization have been received and are published herewith as proving of undoubted interest to the whole membership.

TO THE COMMITTEE ON AIMS AND ORGANIZATION,
GENTLEMEN:

I have before me a program of your Committee. I am very heartily in favor of practically your entire program except on two points:

The Code of Ethics virtually amounts to a restatement of the code that applies not only to every decent individual, but applies to every individual in the state that is embodied in the elementary laws in the injunction that "thou shall not steal," etc.

It has been the universal experience of mankind that there are a certain number of people who will require no code, and there are a certain number of other people who are inclined to stray from the straight and narrow path if left to themselves, but are kept in that by fear of the penalties provided for straying.

It has not yet occurred to any lawmaking body that it could secure respect for an adherence to the law when it did not provide these laws with teeth.

The trouble with nearly all of the various "Codes of Ethics" is that their framers, for one reason or another, probably not unconnected with lack of courage to provide the teeth, leave such codes in a condition that they are little more than a nice little set of copy-book rules of conduct for nice little boys and girls.

Our Society also has a very nice little set of such rules and it also has found that the provision of those rules has caused nothing but trouble when some member mistakenly thought that the provision of the rules by the Society also imposed some obligation on the Society to see to their enforcement. Such mistaken member was unquestionably sound in his supposition and in the consequent request made on the Society or the committee in charge of the Code for an actual enforcement.

I am not opposed to a code; I am, however, absolutely opposed to a code that has no teeth. Personally, I should hate being a member of a committee charged with enforcement of a code, and I believe it would be an exceedingly difficult matter to secure a committee that would accept such charge. Should it be decided to put out a code with teeth and it should be further decided that a committee could be found charged with its enforcement, then I would vote for such code, but, unless both these things were done, I should most decidedly oppose the creation or the maintenance of such dead-letter code.

Legislative Matters: This subject is one that bristles with difficulties and danger. If the Society as a society will lay the foundation for legislation and jurisdiction, it will be doing a very good work.

If the Society attempts to make definite recommendations for legislation or codes of laws, etc., it will be venturing into a domain in which it has no experience and is pitting itself against interests that are decidedly experienced and that in only too many cases are inclined to work along lines and ways that, like those of the "heathen Chinee," are peculiar, to say the least.

Moreover, in so venturing the Society will largely, probably, defeat its own ultimate purpose and will most certainly raise opposition to those purposes instead of securing adherence.

If any proof were needed it is found in the history of our Boiler Code. That Boiler Code has now come to be accepted as the proper basis for boiler legislation. Lawmaking bodies all over the country, whether local councils, common (very common) or select, or state legislators, have come to accept the Boiler Code as a basis on which to build up their laws and ordinances.

In doing that they made legislative errors; it was those legislative errors that were found to need correction, but the Boiler Code as a basis was unaffected. Had we, as a Society, made an attempt to codify laws, that could only have been an attempt to put the Boiler Code into legislative form, with the result that any error or mistake of inexperience or otherwise would have thrown contempt on its engineering features instead of leaving that contempt where it belonged, with the inaptitude of the lawmakers. As a Society we would have appeared, not as competent engineers, but would have had all of the odium attaching to meddlers.

Philadelphia, Pa. HENRY HESS.

TO THE COMMITTEE ON AIMS AND ORGANIZATION,
GENTLEMEN:

Referring to your circular to the members requesting suggestions as to the attitude of the Engineering Profession toward the great economic and social problems of the day, there are two distinctive features of an engineer's training whose value seem to be emphasized at this time. One of these is construction as opposed to destruction, and the other is compromise.

No true engineer can witness waste without actually suffering at the spectacle. The moment human disturbances occur, destruction and waste seem to follow almost immediately. It would seem that one of the most far-reaching influences which the engineer could ex-

ert is the creation of a natural abhorrence of waste, which is one of the fundamentals of his training. If the children of the nation could become imbued with this feeling as a part of their natural everyday thought, the effect would be far reaching in the economic development of the country.

As to compromise, the recognition is so general that good engineering represents successful compromise that those who acknowledge the achievements of engineering must acknowledge the value of the method.

The present seems propitious to the spread of these doctrines of the engineering profession to all ages and all walks in life.

Washington, D. C.

W. N. DICKINSON.

TO THE COMMITTEE ON AIMS AND ORGANIZATION.

GENTLEMEN:

Replying to your recent leaflet entitled "Reorientation" in which you have put the questions regarding the attitude of the engineer toward social and economic problems and his attention toward fields of greater influence, I suggest that some attention be given to the matter of promoting the training of our factory workers. We have taken too much for granted on this subject in the past and all must agree that the plans conceived by the engineer could be carried out to a higher degree of perfection, if our workmen were in better condition to execute such plans. We must not fail to recognize that there is a great need for intelligence upon our factory floor.

It would seem that such a program could be no better fostered than by our Engineering Society. Our engineers have in mind what could be done and if they would give the matter more attention, they could quite effectively institute general factory training on a very sound basis.

This Service (U. S. Department of Labor, U. S. Training Service) has been formed for promoting, in a federal way, such training in the industries, but the problem is a national one and needs the strong and active support of such a society as ours.

I am writing the above as a member of the A. S. M. E. but am referring the subject to the Director of this Service with the hope that he may take the matter up with you further.

J. F. JOHNSON,
Chief of Training Methods.

618 Seventeenth St., N. W.,
Washington, D. C.

A Voluntary Professional Service

THE most "professional" activity of an engineering society is undoubtedly its work upon engineering subjects. If the committees doing such work are judiciously selected, to secure the strongest and also the most representative men, the organization is enabled to achieve results of far-reaching importance.

The American Society of Mechanical Engineers undertook dimensional standardization shortly after its organization, forty years ago. It is conceded to have recently taken a high place in the standardization of design, in the A.S.M.E. Boiler Code, and hopes to achieve a similar distinction in the A.S.M.E. Power Test Codes. With great faithfulness and foresight, its Standardization Committee has formulated a mode of procedure for all standardization work and, in connection with the formation of the American Engineering Standards Committee, has laid the very foundation for standardization in the United States.

Below is a brief review of the status of some of the important current professional committee work of the Society. Suggestions of similar subjects for investigation and report are solicited and will at all times be welcomed by the Council.

American Engineering Standards Committee. On October 19, 1918, representatives of the four Founder Societies and the American Society for Testing Materials met in the Engineering Societies Building for the purpose of organizing the American Engineering Standards Committee. Prof. Comfort A. Adams was elected chairman, and Mr. George C. Stone, of the A. I. M. & M. E., vice-chairman. This Joint Committee is at present composed of three representatives each of the American Society of Civil Engineers, American Society of Mechanical Engineers, American Institute of Mining and Metallurgical Engineers, American Institute of Electrical Engineers, and the American Society for Testing Materials.

Early in January representatives of a large number of societies and organizations interested in the formulation of Safety Standards were called to Washington by the Bureau of Standards. Chairman Adams attended this conference and urged its support and coöperation. A number of conferences and joint committee meetings have since followed, with the result that a sub-committee of the American Engineering Standards Committee is now at work on a revision of its Constitution and Rules of Procedure, which will broaden its activities and increase its usefulness to American industry.

This revised Constitution will be presented to the governing boards of the member societies for their approval, but it will in no way change the purposes for which this committee was organized, which are (1) to unify and simplify the methods of arriving at engineering standards, to secure coöperation between various organizations, and to prevent duplication of work; (2) to promulgate rules for the development and adoption of standards; (3) to receive and pass upon recommendations for standards submitted as provided in the Rules of Procedure, but not to initiate, define or develop the details of any particular standard; (4) to act as a means of intercommunication between organizations and individuals interested in the problems of standardization; and (5) to coöperate with similar associations in other countries.

Committee on Pipe Flanges and Fittings. The work of this Committee was outlined somewhat at length last September. Since that time its report on American Low-Pressure Standards and American Hydraulic Standards for 800, 1200 and 3000 lb. pressure appeared in the October issue of THE JOURNAL and was presented at the Annual Meeting in December. This latest report has received the same favorable comment as its predecessors, and reprints of it are in great demand.

Committee on International Standard for Pipe Threads. It was in July 1914 that the last meeting of the International Commission on Standard Pipe Threads was held in Paris. This Society was represented at that meeting by Lawrence V. Benêt, who acted under instructions from the above-mentioned Committee of which Mr. E. M. Herr is chairman.

Since that time the war has made progress in this direction impossible. The return of peace, and more particularly the visit of Mr. Stanley G. Flagg, Jr., one of the members of this Committee, to England, France and Belgium, has, however, again called the Committee into activity. A joint meeting with the Committee on Screw Threads and Threaded Parts was held on March 27, and at that time the present pipe-thread situation in this country and abroad was carefully reviewed. Mr. Flagg was also given some general instructions to guide him in his conferences with those interested in this phase of standardization.

Committee on Power Test Codes. In December 1918 this Committee passed through a complete reorganization. It now consists of a Main Committee of twenty-seven members and nineteen Individual Committees, which have an average membership of six, making a total number of men engaged in this work an even hundred. The Committee includes both members and non-members of this Society. Practically all of the various committees are already at work on the revision of their individual codes, and one or two of them report that their work is nearing completion. When the codes are finally completed and approved by the Main Committee and the Council, it is planned to issue them individually in pamphlet form and also combined in one volume. In view of the fact, however, that it will be a year or more before this work can be satisfactorily completed, the Committee has authorized the reprinting of a small edition of the 1915 Code for use until the revised code is published.

Committee on Standardization of Shafting. Prompted by the war necessity to conserve steel, and by an increasing sentiment in favor of this reduction in the number of sizes of transmission shafting, a committee of five on Standardization of Shafting was appointed by President Main last October. The personnel of the Committee is as follows: Cloyd M. Chapman, *Chairman;* George N. Van Derhoef, R. E. Nelles, Hunter Morrison, Louis W. Williams. Under the able and energetic leadership of Mr. Chapman, this Committee has pushed its work in a rapid manner. It soon cleaned up the transmission-shafting situation and then undertook the standardization of shafting used in machinery manufacture. More than five hundred letters have been written to more than three hundred different manufacturing concerns, and the responses requesting data and suggestions have been very cordial and entheir hearty approval of the work that the Committee is undertaking.

SOME OF OUR PROBLEMS

THE Committee on Aims and Organization held a full meeting at Wernersville, Pa., beginning April 24, at which the discussion of the activities of the Society was crystallized into definite recommendations on policy. These will be presented first to the Council and then to the membership of the Society at the business meeting to be held at Detroit, June 16, in connection with the Spring Meeting.

In view of the present magnitude and continued growth of the organization itself, and of its position in the field of similar organizations, the task of this committee to prepare a report is a herculean one, and the committee will probably limit its recommendations to the biggest questions which are at issue, leaving the details of methods of procedure to be worked out later.

A Big Issue

For example, probably the main issue is whether or not the Society, as one of the four national engineering (and heretofore mainly educational) societies shall develop activities in the field of what is generally termed "public affairs," or whether all such activities shall not properly be taken care of for the Society (as one of the four national engineering societies) by joint bodies created by the national engineering societies, such as the Engineering Council.

Our Professional Activities

Another vital question is the professional activities of the Society. There was a time when the entire membership of the organization attended the general meetings and all contributed to the program. Nowadays, if even five per cent came forward with contributions to the program of a general meeting the convention would be swamped. The development of the Local Sections meetings would appear at first sight to offer some measure of relief, but the Sections thus far have been so very busy developing connections with local bodies that their organized participation in the national professional affairs is still only a possibility.

Development of Our Literature

The development of the Society's literature is another main problem which necessitates a far-sighted solution. The requirements of the field of engineering literature have encouraged the Publication Committee to develop MECHANICAL ENGINEERING (The Journal) to a point where it can no longer be regarded as a Society organ solely, and the relations of The Journal and Transactions have consequently changed so radically that they are practically entirely separate publications.

Two Big Professional Jobs

Then come the standby questions of the Society's participation in research and standardization. In regard to the former, we have had a standing Committee on Research for many years, the original conception of the committee being that of a clearing house rather than an agency for doing research work. Four or five years ago the committee made quite some progress and accumulated data on (a) laboratories in colleges, their equipment and readiness to serve, (b) laboratories in industrial companies, their equipment and willingness to serve, (c) public laboratories, (d) private laboratories.

A little later some definite research was undertaken by the committee itself and sub-committees on lubrication, flow of steam, etc., were formed and grants of money made.

Research and Engineering Foundation

Then came The Engineering Foundation, the work of which the Society jointly directs. All our data on laboratories was turned over to The Foundation. This agency has not yet determined on its scope and definite field of work, however. In its second year it gave its entire income to the National Research Council.

This year our Research Committee has taken on greater activity than ever before in our Society or in any other similar body, including The Engineering Foundation. Our expenditures this year for research will be between four and five thousand dollars. See this committee's department in Section 1 of this issue.

As a unique activity and as part of the societies' Library Service Bureau and our own service in The Engineering Index, our Research Committee is offering research bibliographies. When these are for private or commercial undertakings they are charged for at our usual rates of $1.50 an hour; but when they are unselfish and for the general good and advancement of the arts, with the publication being made first in our periodical, the Research Committee donates the bibliography.

The industrial supremacy of the nation in the great world competition is dependent on research, and our Society as the "Society of the Industries" may well aspire to a leading position in this field.

We Father Standardization

In standardization our Society has undertaken dimensional standardization since its beginning, forty years ago. It has recently taken first place in standardization of design, in the Boiler Code, and we are apparently about to achieve similar distinction in the Power Test Codes. The Society's standing Committee on Standardization has not yet participated directly in the work of the various committees on standardization subjects, however, which according to the By-Laws make their reports direct to the Council without review or direction by the Standardization Committee.

On the other hand, with great faithfulness and foresight, the Standardization Committee has formulated a mode of procedure for all standardization work and, in connection with the formation of the American Engineering Standards Committee, has laid the very foundation for standardization in the United States.

Societies Slow on Education

Another problem is the development of our connection with education and special training. On the whole, the engineering societies in this country have been apathetic on this subject, while abroad the societies have been in cases conspicuously influential.

About ten years ago several of the American societies, including the Society for the Promotion of Engineering Education, formed a joint committee whose work was later financed by the Carnegie Foundation and whose report has just been issued. So far as is known, however, none of the societies are actively "following up" the report.

Past-President Hollis recently proposed a plan for our Society of a Committee on Relations with Colleges and this was sanctioned by the Council at its February meeting. This committee will merge our old committees on Student Branches and on Student Prizes and, for the time being, our Committee on Junior Prizes, and one of its first activities will be an investigation and report on awards by the Society for meritorious work.

Shall We Continue Employment Work?

The employment work of the engineering societies now presents a problem. Our Society has maintained an employment service for a quarter of a century. The cost of this work last year was just under $3000 and about seven per cent of the membership was directly benefited. The Minings and Electricals maintain similar services, but not to the extent we do.

There are many who believe that such an activity as an employment service is undignified and outside the scope of a professional society.

The four national engineering societies have now merged their

several departments into the Engineering Societies Employment Bureau, which is at present taking care of returned soldiers and sailors, as well as members of the societies, in about equal proportions. While the Bureau opens up a valuable medium of service, it also entails considerable expense, which is at present its greatest handicap.

Problems in Financing Activities

Mentioning the financing of the Bureau suggests discussing the finances of the Society and of the joint activities in which it participates.

Our heaviest expense is for publications, on which last year we spent $109,000 gross, or $12.49 per member. Our budget this year estimated $117,000 gross, to which $10,000 was added for the development of the Engineering Index. Since this estimate was made, however, we have had increases in our printers' rates amounting to 46 per cent on the average. Also our paper, which we were buying about four years ago at about 4.65 cents per lb. and which at the beginning of the war went up to over 11 cents, then during the war down to just over 8 cents, is now just over 10 cents again. This increased cost of publications will have to be added to our original appropriation for this item.

A small increase over original estimates is also required for our joint activities, for which we estimated in October last $13,000, and perhaps a word of description will clarify these activities.

Our Joint Activities

Going back to the beginning for a minute, the United Engineering Society was created in 1904 to administer a trust established by the gift of Mr. Andrew Carnegie to the American Institute of Mining Engineers, The American Society of Mechanical Engineers, and the American Institute of Electrical Engineers—the Founder Societies—which made possible the erection of the Engineering Societies Building in New York. The American Society of Civil Engineers was later admitted as a Founder Society on equal terms.

The objects of the United Engineering Society, as stated in its By-Laws which were adopted by the Founder Societies, are "to advance the engineering arts and sciences in all their branches, and to maintain a free public engineering library."

In accordance with these By-Laws, which have been amended from time to time, and amendments adopted by the Founder Societies, the U. E. S. has developed The Engineering Foundation, the Engineering Council and other activities which are essentially joint activities of the Founder Societies.

Our Latest Financing Problem

The U. E. S. believes that great benefits can be derived from these joint activities and that through their media valuable connections can be established with other bodies. For example, the Engineering Council has admitted the American Society for Testing Materials and has several other applicant societies on its list; the Engineering Societies Employment Bureau is endeavoring to coöperate with similar bureaus of other organizations throughout the country. The Engineering Foundation has already financed the National Research Council, etc.

The matter of financing these joint activities as they develop therefore becomes one of importance, as obviously fees and dues from members of societies such as the Founder Societies cannot be expected to be applied to such large developments as are being made. Furthermore, the expenses of the societies themselves do not allow a sufficient margin for such application.

The U. E. S. has developed some suggestions looking toward a solution of the problem, from which it is hoped will evolve a plan for jointly developing a scheme of financing which can be submitted to all the societies invited to join in the support of the joint activities.

The above observations are not intended to anticipate, in any way, the report of the Committee on Aims and Organization. The statements are merely given to show the kind of a job this Committee has been confronted with in its investigation of the Society's activities. These are only a few statements of our internal affairs on which the Committee is reporting more fully, as well as on the relations of the Society to other Societies and to the community at large.

If these statements serve to call attention to the duty of every member to interest himself in the program of work of his organization and to cause him to look forward to the report of the Committee on Aims and Organization on the problem which was given it to solve, they will have accomplished their purpose.

AMONG THE LOCAL SECTIONS

Visit to Far West by the Secretary

AFTER a trip of over seventy-five hundred miles, which included stops at over a dozen of the leading cities of the Far West, Mr. Rice is again at the Society's headquarters. As a result of his trip committees have been organized at Houston, Seattle, Spokane, Salt Lake City and Denver, with a view to establishing Sections at an early date. In addition a great deal has been done to bring about coöperation of the various local organizations in these centers, where Mr. Rice has emphasized the importance of the local societies and the need for participation in civic affairs.

The season of Section activities is fast drawing to a close, as few of the Sections do much during the summer months except in the way of arranging for occasional excursions. Some of the Sections held their annual election of officers last month, and the remainder will choose their leaders for the coming year during May. These elections are becoming more and more of increasing importance because of the added responsibility which has been put upon the Sections each year. The membership of the various Sections should keep constantly in mind, therefore, that in the selection of their officer material they are developing men who may advance to leadership in the Society, possibly as members of the Council.

During the past month visits to the headquarters of the Society have been made by the following Sections officers: Earl F. Scott, Atlanta; L. W. Wallace, until recently Chairman at Indianapolis; L. E. Strothman and Edward Hutchens, from Milwaukee; H. E. Wells, Bridgeport Branch of the Connecticut Section, and W. G. Starkweather of Boston.

There are two features of national importance in which the Sections might participate to advantage at this time: the first, rendering service to the returning engineers and soldiers who have been serving in France to enable them to secure positions promptly; and the second, where Student Branches are located, coöperating in placing this year's graduating class.

Spring Meeting Conference

As usual, there will be a conference of Sections representatives at the Spring Meeting on Tuesday, June 17. This will be in the nature of a luncheon with members of the Council. Likewise, the members of Sections will be interested in a notice appearing elsewhere in this issue of MECHANICAL ENGINEERING outlining a plan for a joint Section excursion to the Spring Meeting.

Meetings of the Sections

The Committee on Local Sections held a meeting in New York on March 26 and arranged for a visit to Schenectady to attend a meeting of the members of that city, and those in Albany and Troy, for the purpose of organizing a Section. This meeting was held on April 15, and resulted in the appointment of a committee to prepare a petition for the formation of a Section. Mr. H. G. Resit was elected Temporary Chairman. The meeting was held

at the Edison Club. The Sections Committee then visited Springfield, Mass., on April 16, attending the organization meeting of the Engineering Society of Western Massachusetts, which was held at the Hotel Kimball. Over three hundred engineers sat down to supper, and addresses of unusual interest were made by Prof. L. P. Breckenridge of Yale University on the subject of Engineering Organization; by William Spencer Murray on Conservation—more particularly conservation resulting from the construction of a super-power line between Washington and Boston, [this problem is now having the attention of Secretary of the Interior Lane], and by Dr. George Otis Smith, Director of the U. S. Geological Survey. A large group of chairmen of Sections and Branches in New England was in attendance. Mr. Charles L. Newcomb, a member of the Council, was elected first President of the organization.

The Sections Committee continued their journey to Rochester, N. Y., where a meeting was held in the rooms of the Rochester Engineering Society on Thursday, April 17. The members of the committee outlined the work of the Sections in general and the advantages of branches of the national Society in every locality where a local engineering society exists, in order that close co-operation may be maintained between the two groups. Miss Kate Gleason, the first woman to be elected a member of the Society, made the motion which resulted in a petition being signed for the establishment of a Rochester Section.

Those who participated in the trip were Messrs. D. R. Yarnall, *Chairman*, L. C. Marburg, S. B. Ely, Dean Charles Russ Richards, Prof. James A. Hall, Dean Dexter S. Kimball, and Mr. Hartford, of the Society's staff.

SECTION OFFICERS

Prof. W. B. Gregory, who has recently returned from France, has been elected chairman of the New Orleans Section to serve the unexpired term of Mr. H. L. Hutson, deceased.

The New York Section has suffered a loss in the death of its Secretary, Mr. H. D. Egbert. As yet no one has been appointed to succeed him.

Chicago Engineers Discuss Industrial Relations

On March 24 a joint meeting was held by the Chicago sections of The American Society of Mechanical Engineers and the American Institute of Electrical Engineers, and the Western Society of Engineers. Mr. Arthur H. Young, who as manager of the Industrial Relations Department of the International Harvester Company and as safety expert for the United States Government has had a wide experience in connection with safety problems, labor adjustments, safety engineering and welfare work, presented a paper on Industrial Personnel Relations. He outlined the plan of his company for the determination of all questions concerning wages, hours, sanitation and all similar matters by a Works Council, composed one-half of representatives elected by the employees and the other fifty per cent of delegates appointed by the management, the superintendent, staff, etc. The plan guarantees to every employee the right to present any suggestion, request, or complaint and to have it promptly considered and fairly decided. Provision is also made for impartial arbitration and for the recall of employee representatives at any time they become unsatisfactory to their voting division.

Various other speakers referred to similar progressive plans for industrial organization adopted by some of the leading American concerns and, throughout the meeting, there was a patent indication of the lively interest engineers are taking in the discussion of the labor problems of the world.

Soldiers, sailors and marines recently discharged can avail themselves of an unusual opportunity at the Wentworth Institute, located at Huntington Avenue, Boston, Mass. This Institute is providing four-months' trade courses in printing, plumbing, machine work, pattern making, carpentry, etc., and not only are the courses free, but housing and board are also provided without cost to the men. The courses are similar to those given last summer to soldiers being trained as mechanicians for the Army.

Meetings of Sections

ATLANTA SECTION

The Atlanta Section held its last meeting of the season on April 24, when Wm. J. Neville, Secretary of the Section, presented a paper entitled Materials for High-Pressure Steam-Pipe Work.

ROBERT GREGG,
Chairman.

BALTIMORE SECTION

At the invitation of the Poole Engineering & Machine Co. the members of the Baltimore Section attended an excursion to its plant on March 31. The construction and details of the fast turbo-gear and of the new Poole steam turbine, recently described at a meeting of the Section, were exhibited to the members.

The April meeting of the Section was held on the 29th, when Leon Wygodsky, Mem. Am. Soc. M. E., delivered a paper on Oil Engines, and R. E. Munro, Mem. Am. Soc. M. E., presented a paper on Boiler Explosions.

A. G. CHRISTIE,
Secretary.

BIRMINGHAM SECTION

On April 13, O. U. Cook, Metallurgist, of the T. C. I. R. R., presented a paper on Steel Specifications before the Birmingham Section.

JAMES W. MOORE,
Secretary.

BOSTON SECTION

The tenth annual Engineers' Dinner was held in Boston at the City Club on April 2, under the auspices of the local sections of the A.S.M.E. A.I.E.E., and the Boston Society of Civil Engineers, with the American Chemical Society, American Institute of Mining Engineers, American Society of Civil Engineers, Engineers' Club, Illuminating Engineering Society, New England Water Works Association, Plant Engineers' Club and the American Society of Heating and Ventilating Engineers participating.

The speakers of the evening were George H. Moses, U. S. Senator from New Hampshire, who spoke on A League of Nations; and Professor George Fillmore Swain of Harvard University who gave Reflections Suggested from a Recent Trip to France. Richard H. Rice of the General Electric Company acted as Toastmaster, and his remarks are printed elsewhere in this issue.

C. A. Adams, president of the A.I.E.E., Leonard Metcalf, president of the B.S.C.E., Henry I. Harriman, president of the Boston Chamber of Commerce, James J. Storrow and Alfred Hallum, Boston War Camp Community Service, were guests at the dinner.

WILLIAM G. STARKWEATHER,
Chairman.

BUFFALO SECTION

The members of the Buffalo Section held a meeting at the Hotel Statler on April 2, together with the Engineering Society of Buffalo. E. S. Collins, engineer of the industrial-heating department of the General Electric Company of Schenectady, N. Y., delivered an illustrated lecture on Industrial Applications of Electric Furnaces, discussing the application of the electric furnace to heat treating, core baking and enameling. The meeting was preceded by a dinner in the Dutch Grill of the Hotel.

H. B. ALVERSON,
Chairman.

CINCINNATI SECTION

A business meeting of the Cincinnati Section was held on March 25 at which progress reports were made by the various committees; a committee on aims and organization was appointed; and the Chairman was authorized to appoint a Boiler Code Committee for the Section.

The members of the Section at Cincinnati participated in a meeting of the Engineers' Club on April 17. W. W. Freeman, president of the Union Gas & Electric Co. delivered an address on Power Problems of a Modern City and Their Solution.

GEORGE W. GALBRAITH,
Chairman.

CONNECTICUT STATE SECTION

Meriden Branch

A meeting was held on April 28 in the Chamber of Commerce Hall at which Joseph F. Keller, Mem. Am. Soc. M.E., general manager of the Keller Mechanical Engraving Co. gave an interesting illustrated lecture on the Machine Making of Dies.

C. K. DECHERD,
Chairman.

Waterbury Branch

A meeting was held at Waterbury April 8 on the subject of the solution of factory waste problems, which has become a matter of state investigation in Connecticut. Professor Newlands and others spoke.

HUGH L. THOMPSON,
Chairman.

DETROIT SECTION

On April 4 the Detroit Section held a joint meeting with the Detroit Engineering Society, in the auditorium of the Board of Commerce. William B. Stout delivered the address of the evening on Commercialization of Air Craft. For two years before the United States declared war Mr. Stout was associated with Mr. Vincent as chief engineer of the aircraft division, Packard Motor Co., during the war as technical adviser to the U. S. Aircraft Board, and is now chief engineer of the United Aircraft Engineering Corporation at New York. Mr. Stout discussed the various types of machines necessary for different kinds of service; types of engines, new forms of planes, air routes or travel and how laid out, wireless control for night and cloud flying, types for freight and passenger service, necessity for municipal air harbors, and Detroit's opportunity.

F. H. MASON,
Secretary

LOS ANGELES SECTION

The Los Angeles Section held a meeting on April 16, at which F. Honberger, chemist for the Los Angeles Gas & Elec. Corp., read a paper on the manufacture of gas from crude petroleum.

T. J. ROYER,
Secretary.

MILWAUKEE SECTION

A joint meeting of the Engineers' Society of Milwaukee, the Milwaukee sections of all National Engineering Societies and the Aero Club of Wisconsin, was held on April 16, at the Milwaukee Athletic Club. George R. Lawrence, president of the Lewis-Lawrence Aeroplane Co., Chicago, gave an illustrated talk on Flying, Today and Tomorrow.

Mr. Lawrence is the inventor of the aeroplane with which it is proposed to initiate the aero passenger service between Chicago and Milwaukee. The subject was presented in a manner extremely interesting to the layman and yet sufficiently technical to satisfy the engineers.

FRED H. DORNER,
Secretary.

MINNESOTA SECTION

On April 7 the Minnesota Section held its regular monthly meeting at the Midway Branch of the St. Paul Association of Commerce.

RAY MAYHEW,
Secretary.

NEW ORLEANS SECTION

At the regular monthly meeting of the Louisiana Engineering Society, held on April 14, the paper of the evening was presented by Major W. B. Gregory, chairman of the A.S.M.E. Section, on pumping machinery used by the American Army in France.

E. W. CARR,
Secretary.

NEW YORK SECTION

The New York Section joined with the Metropolitan Section of the Society of Automotive Engineers in a Symposium on the Heavy Oil Engine. This meeting was held at the Automobile Club of America on April 9, preceded by a dinner served at the Club. An account of this meeting is given elsewhere in this issue.

W. W. MACON,
Chairman.

ST. LOUIS SECTION

The St. Louis Section held its regular monthly meeting on April 25 at the Hotel Statler. Dwight C. Farnum delivered an interesting address on what the industrial engineer is trying to do in industry.

LEWIS GUSTAFSON,
Chairman.

SAN FRANCISCO SECTION

Two papers were presented before the San Francisco Section on April 16. First, Commander Reed, U. S. N., presented 34 slides and a thousand feet of film describing a destroyer launched in record time, fifteen days, at Mare Island.

A. P. Allen, Mem.Am.Soc.M.E., chief engineer of the Union Iron Works Co. at San Francisco, delivered an illustrated address, his subject being the Modern Destroyer and the Part It Played in Winning the World War.

GEORGE L. HURST,
Secretary.

WASHINGTON SECTION

The second meeting of the Washington Section was held at the Cosmos Club, on April 30. An interesting program was presented including the following: Dr. S. W. Stratton, Standardization of Screw Threads; Colonel E. C. Peck, Gage Work of the Ordnance Department for the U. S. Army; H. L. Van Keuren, Certification of Gages at the Bureau of Standards; C. G. Peters, The Use of Interference Methods in Calibrating Length Standards. Light refreshments were served after the meeting.

GEORGE A. WESCHLER,
Secretary.

Joint Meeting of Student Branches

THE Fourth Annual Joint Meeting of the Student Branches at New York University, Polytechnic Institute of Brooklyn and Stevens Institute of Technology was held on the afternoon and evening of Saturday, April 12th, in the Engineering Societies Building.

Professor Walter Rautenstrauch of Columbia University opened the meeting by giving an interesting lecture on Manufacturing Costs, following the process of a job through its various stages and illustrating the needs for a comprehensive system which will enable an executive to know at all times just where a job stands in regard to its various operations.

Lieut.-Commander B. F. Hart followed with an outline of what the Navy has done during the War and described in some detail the work of restoring the machinery of the several German ships which was damaged before they were taken over by our Government.

Mr. Ernest Hartford, member of the Staff of the A. S. M. E., then outlined the work of the Student Branches and escorted the party through the Engineering Societies Building and extended a standing invitation to the students to make the Engineering Societies Building, and the A. S. M. E. rooms in particular, their headquarters whenever in New York.

Following the supper, Dr. Ira N. Hollis, President of Worcester Polytechnic Institute, spoke on the Aims of the Student Branches and outlined a number of activities which the Student Branches might undertake. He laid special emphasis upon the fact that the subjects discussed in Student Branches should be of cultural value rather than on purely engineering themes.

Dr. Hollis announced that the work of the Student Branches had been placed under the direction of a Committee on College Relations which would also embrace the Student and Junior Prizes now being offered by the Society. He stated it is hoped to develop the activities of this committee so that they will also encompass recommendations as to what will be included in the engineering curricula.

President M. E. Cooley congratulated the students on holding Joint Meetings and advised them to cultivate a hobby. To justify his right to make this suggestion he told them of the pleasure and value which he had derived from the gathering through many years of a collection of oriental rugs. He stated that a number of engineers of his acquaintance pursued the hobby habit and cited one or two instances: Professor L. P. Breckenridge spent one summer vacation gathering ferns growing in the State of New Hampshire and during that time was successful in gathering a greater number of specimens than had been secured by other persons after several years search, thus emphasizing the ability of the trained engineer to systematically gather facts better than those of other professions.

Mr. Ambrose Swasey has a hobby of collecting canes, having sticks from all parts of the globe, many of which he has cut and shaped himself.

Mr. L. P. Alford, Editor of Industrial Management, gave a talk on The Place of the Engineer in Reconstruction.

Major Frank B. Gilbreth concluded the program with a talk on Motion Study.

The students then enjoyed a smoker and refreshments. The orchestra of Polytechnic Institute of Brooklyn began the program in the afternoon with an overture and many selections interspersed the addresses and entertainment features of the program.

At the close of the meeting the students were presented with a number of souvenirs which had been obtained by the Committee on Arrangements which included the following: Messrs. A. A. Landi and H. E. Briggs from New York University, Messrs. N. N. Wolpert and M. J. D'Aiello from Polytechnic Institute of Brooklyn and Messrs. L. V. Aquadro and H. E. Beaven from Stevens Institute of Technology.

The date of the meeting was scheduled to make possible the attendance of the Senior engineering students of Pennsylvania State College and Ohio State University who were in New York on their annual inspection trip. About forty-five of these students were present and in addition, a delegation of engineering students from Pratt Institute of Brooklyn.

Meetings of Student Branches

ARMOUR INSTITUTE OF TECHNOLOGY

February 18. Professor D. E. Roesch delivered a talk on High-Compression Engines and the Use of Benzole as a Fuel. The methods of injecting the fuel in the Diesel and Hvid engines were taken up in detail.

H. G. ANDERSON,
Branch Secretary.

BUCKNELL UNIVERSITY

March 6. At the regular monthly meeting the question, Is an Engineer more suitable for a College President than any other College Graduate, was discussed by President R. G. Carulla, Professor F. E. Burpee and J. B. Witson.

C. W. WITHINGTON,
Branch Secretary.

CARNEGIE INSTITUTE OF TECHNOLOGY

February 12. Mr. Henry Kreisinger, Mem.Am.Soc.M.E., and of the U. S. Bureau of Mines, gave a talk on Air Supply in the Combustion of Coal, in which he told of the amount of air required in a practical furnace, the methods of getting this air into the furnace and the distribution of the volatile matter above the bed of the fire as a result of these methods.

The marine boiler as used on modern cargo vessels was shown, together with the work done upon it by the U. S. Bureau of Mines.

March 19. Mr. Pfouts gave a talk on Natural Resources of our Country in which he described the resources twenty-five years ago as compared with those of today. He showed the responsibility of the engineer as a conserver of these resources.

Some of the experiments in trying to find a substitute for wood in aeroplane propellers were also related.

DAVID C. SAYLOR,
Branch Secretary.

UNIVERSITY OF CINCINNATI

February 21. Mr. E. F. DuBrul, of Cincinnati, delivered an interesting talk on South American Business Methods and Opportunities. He emphasized the many opportunities in South America for the capable and well-trained man, but also stated that an understanding of the language and customs of South America is indispensable if the salesman or engineer is to make good in Latin America.

March 13. Mr. A. J. Baker, sales engineer for the Cincinnati Milling Machine Co. delivered a talk on Salesmanship in which he compared the characteristics of the working element with the educated class from a salesmen's standpoint.

C. L. KOEHLER,
Branch Secretary.

CORNELL UNIVERSITY

January 27. The first meeting of the year was held for the reorganization of the Branch. Professor D. S. Kimball gave a lecture on Modern Water-Power Developments.

Dean A. W. Smith gave a brief talk on the aims and purposes of the Student Branch organization.

February 14. The following officers were elected for the year: W. M. Sawdon, honorary chairman; C. R. Tobey, chairman, and L. E. Kittredge, secretary.

The subject of the meeting, which was discussed quite fully, was the Una-Flow Engine, general principles involved in the construction, and reasons for its efficiency. The lecture was illustrated by lantern slides, including photographs, plans and performance curves.

L. E. KITTREDGE,
Branch Secretary.

GEORGIA SCHOOL OF TECHNOLOGY

March 21. The Student Branch met as the guests of the Atlanta Section to hear a paper on Pulverized Coal as Fuel by Mr. N. C. Harrison of the Atlantic Steel Company. The paper was exceedingly interesting and instructive.

March 29. At this meeting, the Branch had as their guests the National Association of Stationary Engineers of Atlanta. The speaker of the evening, Mr. Wikle, Chief Engineer of the Fulton Bag and Cotton Mills, gave a very interesting and instructive talk on power plant operation and the difficulties encountered by the average engineer on such work. At the conclusion of his talk, a general discussion followed and Mr. Wikle answered all questions.

JOHN K. PAISLEY,
Branch Secretary-Treasurer.

JOHNS HOPKINS UNIVERSITY

January 27. At the second meeting of the Student Branch Calvin W. Rice, Secretary of the A.S.M.E., gave a talk regarding the Society and extended a cordial invitation to the Branch to make use of the resources of the A.S.M.E. headquarters in New York.

Mr. Louis C. Marburg, Chairman of the Aims and Organization Committee of the A.S.M.E., spoke briefly on the progress made by engineers in the last two generations, and pointed out that great things were in store for the profession if engineers chose to broaden the field of their efforts, with especial attention to labor conditions.

The president announced that the Aldred lecture of March 5 would be delivered by Mr. James Hartness, Past President of the A.S.M.E.

HARRY E. WEAVER,
Branch Secretary-Treasurer.

UNIVERSITY OF KANSAS

March 6. A paper on the Development of Tractors was given by C. A. Williams, in which he called attention to the great changes in the development and stardardization of the tractor. Mr. J. R. Wahlstedt gave a report of the Tractor Show.

A paper on the Development of the Automobile was given by Mr. T. Wright and a report of the Automobile Show by Mr. G. Malcumus.

April 3. Following a business meeting several interesting papers were delivered:—

The Diesel Engine, especially the latest methods of cooling the piston, was discussed fully by Mr. Rupart. Tonnage of U. S. Merchant Marine showing the late growth of shipbuilding was given by Mr. John Bunn. The Submarine was given by Mr. Kell. The details of construction of concrete ships and the results of several trials was described by Mr. Baker. Hydraulic Transmission showing the advantage of using this type on ships was given by Mr. Davidson. A paper on Electric Welding was given by Mr. Love.

C. K. DIEHL,
Branch Secretary.

LELAND STANFORD JR. UNIVERSITY

January 26. The Stanford Branch extended a welcome to Professor W. F. Durand, who recently returned from France where he has been serving as scientific attache of the American Embassy. The welcome was in the form of a banquet, all mechanical, civil, electrical, chemical engineers and geologists were invited as guests of the local A.S.M.E. A speech of welcome was given by the president of the University, Dr. Ray Lyman Wilbur, to which Professor Durand responded by telling of his joy at being home and going on to describe the outward appearance of Paris during the different stages of the War. The banquet was attended by two hundred and fifty engineers.

March 5. A lecture on boilers was given by A. C. Cross of the Babcock & Wilcox Company.

March 12. Professor Durand addressed the society at its regular meeting, telling of some of the new methods of communication and ways of combating the submarine brought out by the War.

The meeting closed with the election of officers for the following quarter. Donald T. Robbins was elected branch chairman, and E. J. Baughman, branch secretary and treasurer.

E. J. BAUGHMAN,
Branch Secretary-Treasurer.

LOUISIANA STATE UNIVERSITY

March 6. Professor C. V. Elliott, formerly of the General Electric Company, delivered an interesting lecture on Electric Arc Welding.

CLIFFORD COLOMB,
Branch Secretary.

UNIVERSITY OF MICHIGAN

March 5. The first regular meeting of the branch was held, at which business was transacted and committees announced. It was decided to have some debates at the future meetings, the purpose of these debates being not so much to give the student any great amount of technical information, but to give him practice in expressing himself before an audience. Professor J. E. Emswiler, honorary chairman, spoke on The Student Branch in which he pointed out the benefits the student might derive from the branch, and also how the branch can be of assistance to the University. Professor W. T. Fishleigh who has been in service since the outbreak of the War as Lieutenant Colonel in Motor Transport Corps, gave the address of the evening, Twenty-four Years Forward in Twenty-four Months, in which he told in a very interesting manner of the various ways in which our nation has made tremendous advancement in the last two years.

March 31. A short business meeting was held at which three committees were announced and some new business attended to.

Professor Anderson, the speaker of the evening, gave a very interesting lecture, The Value of a Dollar, and illustrated how its value had fluctuated since 1910 and how different concerns meet the fluctuation.

ANDREW D. ALTHOUSE,
Branch Secretary-Treasurer.

POLYTECHNIC INSTITUTE OF BROOKLYN

March 6. A trip of inspection to the Brooklyn Navy Yard was made by the engineering society.

March 14. An interesting lecture, illustrated by slides, was delivered by Mr. W. W. Montaloo on Water Softening by Hot Process. He explained the various difficulties encountered by using impure water for boilers.

March 28. The Student Branch held a Joint Meeting with the Chemical Engineering Section at which Mr. Brown of the Metal and Thermit Corporation was the speaker of the evening. He spoke on Thermit Welding and was aided by several assistants, as well as lantern slides, moving pictures and some practical demonstrations. There was an attendance of over two hundred. The speaker described the various kinds of welding, namely oxy-acetylene, electric and thermit welding; the first two of which are used for comparatively light work, while thermit welding is used for heavy machines, such as parts of locomotives, shafts, marine repairs and other heavy work. The lecture was concluded by having an actual weld demonstrated. Two pieces of pipe were clamped together and then the crucible containing the Thermit was placed over these pipes, the thermit was ignited and when it reached a molten state, it was poured around the clamped pipes. In a few minutes the clamps were removed and the pipes were welded in good fashion. A mass of molten iron was also welded to a piece of coldsteel.

M. J. D'AIELLO,
Branch Secretary.

PENNSYLVANIA STATE COLLEGE

At a recent business meeting the following officers were elected: H. W. Parthemer, chairman; I. A. Karam, vice-chairman; C. W. Moore, secretary; R. H. Schmidt, corresponding secretary, and R. Y. Sigworth, treasurer.

R. H. SCHMIDT,
Corresponding Secretary.

VIRGINIA POLYTECHNIC INSTITUTE

March 20. A meeting for the purpose of organization was held and the following officers were elected: W. R. Metz, chairman; W. A. McBurney, vice-chairman; A. Harnsberger, secretary-treasurer.

A very interesting talk was given by W. R. Metz in which he set forth the purpose of the society and its value to the student, both while in college and in later life.

A. HARNSBERGER,
Branch Secretary-Treasurer.

WASHINGTON UNIVERSITY

February 4. The Branch held its first Smoker this year, which proved most successful. Mr. L. C. Nordmeyer, who has recently returned from his second trip to China, gave an interesting talk, illustrated by many slides, of his work on the refrigerating and desiccated egg industry. After the Smoker light refreshments were served.

WM. J. ANDERSON, JR.,
Branch Secretary.

YALE UNIVERSITY

March 7. A joint meeting of the A.S.M.E. New Haven Branch and the Yale Mechanical Engineers' Club (A.S.M.E. Student Branch) was held at which Lieut. Commander D. C. Buell, U. S. Naval Reserve Force, delivered an illustrated lecture on Long-Range Navy Guns with Railway Mount, which were used with great effectiveness in service in France.

WM. L. AUSTIN, JR.
Branch Secretary-Treasurer.

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications and positions listed below combine the services of the Society and of the Engineering Societies Employment Bureau, Room 903, Engineering Societies Building.

POSITIONS AVAILABLE

Stamps should be inclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society records.

ENGINEER OR DRAFTSMAN with experience in designing high-vacuum, steam-air ejectors. Location, New York section. E-01.

MACHINE-SHOP FOREMAN, a mechanic with technical education. Ambitious; experienced in production of bushings or other small parts, quantity runs; understands tooling of automatic equipment necessary for low-cost production. Submit details, age, education, dependents, positions held last five years. Excellent opportunity for bright worker who can handle men. Location, Pennsylvania. E-076.

ENGINEER who can invest $10,000 in an established company, one capable of selling and superintending installations of combustion-control system; acquainted with best firing methods for power plants and thoroughly familiar with details of operation. Good salary to start. Location, Philadelphia. E-083.

MECHANICAL ENGINEER for research, development and designing for the improvement of propeller or disk fans, familiar with modern aerodyamic theory. State age, training, previous experience and salary expected. If not familiar with aerodynamic theory, state mathematical training, also references to any research or development work. Ability to read both French and German, particular the latter desirable. E-090.

DRAFTSMAN, young man who has recently been graduated with honors in mechanical engineering course, proficient in the profession and of good character. Location, New York. E-092.

ESTIMATING AND SALES on power-plant equipment in the Eastern States. Young technical graduate in mechanical engineering. E-093.

DRAFTSMAN, high grade, experienced in pipe work, structural steel, and concrete design, having also outside experience. Salary from $125 to $150 per month. Location, Pennsylvania. E-094.

TIME STUDY MAN, experienced in plant where Gantt's principles have been practiced, also experienced in the manufacture of small interchangeable parts. Location, Philadelphia. E-095.

SALES ENGINEER. Well-established company desires to make connection with competent sales engineers to act either as assistants or managers of district offices; must be thoroughly experienced in steam engineering and have thorough knowledge in application of steam engines in power plants. Reply should give complete education and experience of applicant, together with age, reference, salary expected, etc. E-098.

MARINE SALES ENGINEER. Well-established company is desirous of adding to its sales organization several highly experienced marine sales engineers. Thorough knowledge of marine engines and auxiliary equipment as well as thorough acquaintance with ship industry required. Give complete education and experience of applicant, together with age, reference, salary expected, etc. E-099.

SALES ENGINEER, man about 30 years of age, with experience in sales lines and who has had commission in overseas service, for concern doing general power-plant and steam-equipment business in stationary and marine power plants. New York City. E-0100.

RECENT ENGINEERING GRADUATES, men preferred who have seen service abroad, to work into sales organization, New York and adjacent territory, for concern doing general power-plant and steam-equipment business, both stationary and marine power plants. E-0101.

DESIGNERS on Machine Tools. Should possess knowledge either of design of hand-screw machines or considerable experience in operation of such machine. Want men with real aptitude for grasping ideas that will be given to them, and from that to work on design of machine of type specified. Three or four men that possess creative ability and who can make employment for other men in the organization. E-0102.

SUPERINTENDENT capable of designing, installing and operating equipment to manufacture small a.c. motors, 1 hp. and smaller. Apply by letter. Location, East. E-0105.

DESIGNER capable of designing and operating engineering departmetnt for output of small a.c. motors, 1 hp. and smaller. Apply by letter. Location, East. E-0106.

DESIGNING ENGINEER, high grade, one familiar with centrifugal compressors and steam-turbine work. Location, Massachusetts. E-0107.

SUPERINTENDENT of factory engaged in manufacture of special tools and dies, metal stampings, sheet-metal specialties, wood and metal patterns. Location, Middle West. E-0108.

ASSISTANT TO CHIEF ENGINEER, mechanical engineer, young man, graduate of recognized mechanical engineering school preferred; with several years' experience designing machinery for iron and steel works. Permanent position and good chance for advancement. State age, experience and salary expected. E-0109.

ASSISTANT TO SALES MANAGER to take charge of foreign sales department. Man with knowledge of conditions in France, Italy, Belgium, England, Japan and China, and familiar with heavy machinery for iron and steel works preferred. E-0110.

PRODUCTION ENGINEER OR ASSISTANT TO WORKS MANAGER for Lancashire, England. Factory employs about 1500 workers, produces textile machinery, comprising finishing, printing and dyeing machinery, electrical machinery, centrifugal pumps and fire-prevention apparatus. Applicant must be thoroughly experienced in up-to-date, economical methods of doing work, have been born in Britain, have not less than five years American experience, be university graduate, or have had high-grade technical education, held responsible positions giving good experience and be capable of organizing and conducting production programs.

Only the best qualifications will be considered. Salary 600-750 pounds per year. Contract if required. Age not over 38. E-0111.

ENGINEER experienced in the laying out and building of complete plant operations particularly for complete ice-making plant, to supervise drawing-room work and the building of the plant. Location, New York. E-0112.

SALES ENGINEER with mechanical ability, not necessarily a college gradute, to act as representative for one of the territories of a firm manufacturing carbonic acid gas compressors, carbonating machinery, pumps, etc. Reply giving age, experience, etc. Name confidential. E-0114.

ERECTING ENGINEERS for ice making and refrigerating machinery. Location, Milwaukee, Wisconsin. E-0115.

METAL WORKER, PLUMBER AND STEAM FITTER. Young man, 25-30, in editorial capacity to grow up in work. Technical graduate with steam, heating and ventilating experience; a knowledge of photography valuable; man capable of editing and writing up articles with some knowledge of their truth and interest. Writing ability and a pleasing personality necessary. Salary $35-$40 per week. Location, New York. E-0117.

TWO SALESMEN. Territory probably Jersey as far south as Trenton, and New York State or New York City. Men with actual experience in elevating, conveying and transmission machinery, with considerable engineering knowledge and some selling experienced preferred. Salary would depend upon man's worth. E-0118.

MACHINE DESIGNER, with substantial experience in sheet-metal working machinery. Location, Buffalo, New York. E-0119.

CHIEF DRAFTSMAN to take charge of drafting room and new development work. Experience on adding machines or typewriters. Location, Reading, Pa. E-0121.

EQUIPMENT ENGINEER experienced in foundry equipment, tumbling barrels and similar material, to look after laying out of equipment in various plants, see that the proper provisions are made. Salary will depend upon experience. Location, Detroit. E-0122.

CHIEF DRAFTSMAN, experienced in the design of tools and jigs. Location, Pennsylvania. E-0123.

YOUNG MEN having technical training in mechanical engineering, who could be trained as salesmen in New York and Philadelphia territories. Prefer young college men who would fit requirements in the installation and sale of specialties for automatic temperature regulation. Business is in connection with the better class of buildings of all kinds. Opportunities for advancement are exceptionally good. E-0124.

GRADUATE ENGINEER, who has keen mechanical appreciation and judgment, imagination, vision, and disposition to coöperate, as assistant to the manager of manufacturing. Experience with metal-filing equipment or loose-leaf manufacturing desired, but not necessary. Location, Michigan. Salary to start about $1800 a year. E-0126.

CHIEF DRAFTSMAN AND ENGINEER. Should be technical graduate and familiar with best steam practice, especially with feed-water heater and V-notch meter calculations. Location, Ohio. E-0127.

ADVERTISEMENT AND CATALOG COPY WRITER on engineering and semi-technical subjects. Must possess good business judgment and produce on quality rather than quantity basis. Salary and permanent future wholly dependent upon the man. State terms and qualifications in first letter. E-0129.

TECHNICAL WRITER. Graduate engineer (preferably electrical) who has ability to tell the story of a complicated piece of machinery in clear and interesting style, and carry things through to a finish. The work will consist of writing complete articles, booklets, catalogs, etc., and preparing them for the printer. In addition will be expected to assist in the general publicity and sales promotion work. The man who has the best chance is one who has been in the naval service. Sales experience also desirable. Only written applications will be considered. E-0130.

ENGINEER, experienced in automobile transmissions. Location, Ontario, Canada. E-0132.

COMPETENT MECHANICAL DRAFTSMAN. One having experience in the laying out of tools, dies and fixtures for the manufacture of sheet metal parts. Location, Brooklyn, N. Y. E-0133.

CHIEF DRAFTSMAN experienced in design of plain and reenforced concrete and frame structures in general municipal and highway engineering. Location, Atlanta, Georgia. E-0134.

POWER-PLANT DRAFTSMAN experienced in turbo-generator and auxiliary equipment piping, etc., for large copper company in Arizona. Give full particulars and salary desired. E-0135.

HYDRAULIC ENGINEER acquainted with design and construction of centrifugal pumps. Location probably New York. Name confidential. E-0136.

MECHANICAL ENGINEER familiar with design and construction of gas engines and compressors. Location probably New York. E-0137.

COMPETENT STEAM ENGINEER. Must be able to speak Spanish. Headquarters Mexico City. E-0138.

EXPERIENCED SUPERINTENDENT for small manufacturing plant consisting of machine, foundry and pattern shop. Must be able to systematize work. Location, 150 miles from New York. Salary according to ability. Answer by letter, giving full particulars of past experience. E-0140.

YOUNG MEN, to develop into sales engineer, educated in mechanical lines, particularly with knowledge of internal combustion engines. Location, New York. E-0863.

DRAFTSMAN for general work, some preliminary designing of machines or machine parts, working drawings for repair parts, etc. Location, Georgia. E-0897.

CHIEF INSPECTOR, technical expert for company manufacturing pressure steam and ammonia valves; shop experience necessary preferably in valve work, or in other steam specialties, as adopted to modern power house operation, where high pressure and superheated steam is used. Location, Chicago. E-0898.

ASSISTANT SUPERINTENDENT, technical graduate of middle age with several years of experience in heating lines; to superintend the installation and erection of heating, ventilating and power-plant systems for buildings. Applicant must be American, and preferably married. Salary depends on man. Location, New York City. R-433.

SUPERINTENDENT for plated-ware plant. Must have had wide experience in metal novelty line; necessary for man to be professionally a metal spinner and plater; must understand the mechanical line thoroughly; desirable that he should also understand the making and laying-out of dies. Position with manufacturer of brass, copper, nickel and silver-ware. Location, New York City. R-435.

FOREMAN of testing department. Engineer, well-grounded in accurate, close and small-machine work; must have spent considerable time with one of the larger magneto manufacturing concerns; should also have fair knowledge of electricity in general; be good executive, and possess the personal aptitude that will enable him to work in harmony with other department foremen. Salary, $40 per week. Location, Brooklyn, N. Y. R-443.

SUPERINTENDENT OF WOOLEN YARN MILL. Practical experience and training in different branches of manufacture of textiles; experienced in manufacture of single and two-ply yarn, for knitting purposes; textile school training desirable, but not necessary. Man from 35 to 50 years of age preferred. Salary, $2500-$3000 per year. Location, New York State. R-444.

SALESMAN. Technical training with building trades experience; to sell expanded metal and fireproofing material. Man 27 to 32 years of age desired. Salary depends on qualifications. Location, New York City. R-450.

MECHANICAL ENGINEER. Technical training, knowledge of either French, Spanish or Portuguese. Man 25 to 35 years of age desired. Duties are to supervise and revise in technical French, Spanish and Portuguese advertisements, catalogues, etc., for trade publication. Salary depends upon man. Location, New York State. R-454.

MECHANICAL ENGINEER experienced in cost and taking entire charge of work. Age does not count with man who is already familiar with the business and able to take full charge of work; but if he has to be taught the business a young man is preferred. Location, New York City. R-459.

MECHANICAL ENGINEER with five years' experience for work in connection with development of concrete brick machine and handling appliances. Location, New York. R-461.

ASSISTANT SUPERINTENDENT. Mechanical engineering graduate with four or five years' experience in textile manufacturing or allied lines. Duties will consist of maintaining mechanical equipment of factory building. Stevens man preferred. Salary about $5000 per year. Location, Brooklyn, N. Y. R-462.

CONSULTING ENGINEER experienced in clock making to examine into the feasibility of the manufacture of certain clocks with the idea of deciding whether the proposition would be profitable financially. Location, New York City. R-479.

SUPERINTENDENT OR WORKS MANAGER. Technical commercial education desired, but practical experience will be considered very highly. Must be over 40 years of age and have had at least 10 years' successful experience in the fancy metal goods line as superintendent or works manager. Nature of duties will be to have entire charge of mechanical production of factory producing stamped light-sheet metal articles; safety razors; ladies' hand-bag and pocket book frames and trimmings, etc., which are polished and electroplated in various finishes. Salary depends on man. Location, New York City. R-482.

MECHANICAL ENGINEER; experience in high-pressure superheater and marine engine design. Must be live wire. Salary depends upon man. Location, New York City. R-485.

ENGINEER TRANSLATER. Engineer of Portuguese nationality, who has received his technical training abroad, and has been filling engineering positions in this country, to translate material for catalogues of an engineering character. Location, New York City. R-486.

ENGINEER TRANSLATER. Engineer of French nationality, who has received his technical training abroad, and has been filling engineering positions in this country, to translate material for catalogues of an engineering character. Location, New York City. R-487.

MECHANICAL ENGINEERING GRADUATES (completing their course within the next few months) to take up students apprenticeship course in preparation for responsible positions in production, engineering and sales departments of growing middle-west concern. Company manufactures labor-saving and building equipment requiring engineering knowledge. Apprenticeship course very thorough. Initiative and aggressiveness principal requirements in addition to university training. R-529.

HEAD OF MECHANICAL ENGINEERING DEPARTMENT. Salary $2500 only, but wants a $5000 man of devotion, character, etc. Location, Idaho. E-0142.

DISTRICT SALESMAN. Engineer to represent exclusively in New York District a large water-tube boiler manufacturer. Must be thoroughly familiar with boilers, power plants. Technical graduate and selling experience in New York preferred. E-0146.

MACHINE-TOOL SALESMAN for Philadelphia territory; man thoroughly familiar and experienced in machine-tool trade, able to take care of his own correspondence. State age, experience, and salary desired. Correspondence confidential. E-0147.

MACHINE-TOOL LAYOUT MEN. Only high-grade men will be considered who have thorough knowledge of machinery and possess original ideas. Location, Connecticut. E-0148.

ENGINEER, experienced in supervising the operation of boiler plant. One familiar with charts, gages, power-recording apparatus, etc.; practical experience in the handling of men and keeping plant highly efficient at all times. Plant will consist of three B. & W. boilers of 750 hp. each, operating at 250 lb. steam pressure, equipped with stokers and modern coal and ash-handling equipment. In writing, indicate experience, salary and when available. E-0149.

EXPERIENCED BUSINESS MAN for concern manufacturing high-class brass goods. Executive ability, judge of credits and tact essential. To succeed vice-president and treasurer, deceased. State record and compensation expected, which will be considered confidential. E-0151.

MECHANICAL OR CHEMICAL ENGINEERING SALESMAN for manufacturers of practical boiler feed water treatment used by steam power plants all over the world; desire representation in Cleveland, Cincinnati, Milwaukee and Kansas City. Must be aggressive and experienced in power plants. E-0152.

CHIEF ENGINEER, having wide experience in designing turbine pumping machinery and some experience on jet condensers. Good opening in New Jersey. E-0153.

SALES MANAGER for large and growing manufacturing concern. Young man of experience, energy and executive ability, capable of organizing sales campaign. Mechanical and automobile experience desirable. Remuneration gaged by results. State fully qualifications, experience, age, nationality, when available and salary expected. Location, Ohio. E-0154.

DESIGNER of mechanical-electrical apparatus for long-established organization expanding normal activities after war work. Must be technically trained and have had responsible design experience in intricate mechanism and their manufacture on a large scale. $2000 to $3000. Write, stating experience and training. E-0155.

TOOL DESIGNER with about five years' experience in punch and die, jog and fixture work. Salary, $30 to $40 per week. Apply by letter. Location, New York. E-0156.

DRAFTSMAN on household electrical appliances, farm power and lighting outfits. Preferably with some practical shop experience. Salary $30 to $35 per week. Location, New York. Apply by letter. E-0157.

TIME STUDY MEN to set piece rates on tractor and grain separator work in an old-established plant. Location, Ohio. E-0158.

COMPETENT MAN to take charge of meat packing house in British Guiana. No by-products—straight meat production. English only language necessary. E-0159.

ENGINEER well versed in design and installation of steam and electrical power plants and equipment. Eastern location. E-0141.

SALES ENGINEER. Man who is thoroughly competent in power plant equipment lines, to handle propositions from the commercial end. Must be willing to put in hard work on business end of the proposition. Salary depends on man. Location, New York. E-0144.

MACHINE DESIGNER on miscellaneous apparatus, ingenious and resourceful, able to analyze requirements and produce practical results without constant supervision. Salary $2000 to $3000, depending on man. E-0165.

SALES MANAGER for valve manufacturer. Experienced executive, capable of perfecting selling policy, securing proper distribution, and taking entire charge of sales of well-known line of high-grade valves. Write giving experience and full details. Only high-class men need apply. Applications considered confidential. Headquarters, Middle Northwest. E-0166.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 12th of the month, and the form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

MECHANICAL ENGINEER, army officer, age 32. Four years' civil, 6 years' mechanical and electrical experience, including industrial-plant construction, involving steel concrete, dock-building, pipe work, machine-shop, boiler plant, engine testing, installation, etc. Superintendent a. c. generating station supplying town light and power. Derivation of gases and experimental engineering. Desires to specialize. Strong in executive capacity requiring broad engineering experience. E-349.

SALES ENGINEER, graduate mechanical engineer, age 35, American, 13 years' experience, covering design, manufacture, construction, operation, industrial appraisals, cost analysis and selling to metal manufacturing industries; initiative and ability to get results, keen, aggressive and of pleasing personality. Five years as sales engineer and sales manager for a large manufacturer, covering difficult problems of closing up big business, organizing and following up selling campaigns. E-350.

EDITOR, technical training; 38; married; excellent references; shop and drafting-room experience; at one time owned own machine jobbing shop; contributor to foremost technical journals; systematizer. Authority on "humane" management; adaptable, alive, assertive, tactful. Could serve in advertising department and get out house organ. E-351.

MECHANICAL ENGINEER, experienced in design, operation and construction of chemical, power, and heating plants, power-plant testing, conveyors, water works and gas plants. Considered good executive. Wants responsible position. E-352.

TECHNICAL GRADUATE, age 27, married; shop, drafting-room and teaching experience, recently discharged army officer, desires position giving opportunity to demonstrate executive ability and offering good chances for advancement. Test, employment or sales department of live concern preferred. Will go anywhere in U. S. Salary $200. E-353.

MECHANICAL AND ELECTRICAL ENGINEER, graduate of M. I. T. in both courses, at present Lieutenant in Naval Reserve Force, is available for responsible position requiring engineering and business ability. Married, age 35, eight years' experience consulting, mechanical and electrical engineer, two years general manager traction company, two years production engineer for large company. Highest references. No objection to foreign service. Salary commenserate with position and location, minimum in U. S. $5,000. Will consider position leading eventually to interest in business. E-354

TECHNICAL MECHANICAL GRADUATE, 1915, desires position as assistant to mechanical engineer, or manager. Three years' practical experience in shop, and lately executive experience as civilian inspector in Ordnance Department of U. S. Navy. E-355.

PRODUCTION ENGINEER OR SUPERINTENDENT, 23 years' mechanical experience from toolmaker to executive. Especially qualified in modern machine-shop management, designing of special metal-working machines, tools, and appliances to increase production. Past two years supervising one of largest railroad shops in U. S. Desire to locate in South or Southwest. Salary desired $4000. E-356.

SAFETY ENGINEER. Naval officer just released from active duty, having 25 years' practical experience in steam engineering, installation and maintenance. Past ten years specialized in safety engineering; well-developed executive ability. Salary $3500. Preferred location near New York or Philadelphia. E-357.

MANAGER, assistant to president or engineering executive, with technical education and 18 years' experience in design, construction, equipment, operation and management of industrial plants, seeks new connection in position of responsibility where executive ability and engineering experience can be used to advantage. Thoroughly familiar with modern organization, production, purchasing, selling and accounting methods. E-358.

MECHANICAL ENGINEER desires to connect with corporation in engineering capacity; first requisite being opportunity for advancement. Six years' experience in shop, drafting-room and maintenance work. Technical graduate, married. Location not first thought. Now in government work. E-359.

SALES EXECUTIVE, or Sales Engineer, age 42, for a quality or service proposition, having pronounced engineering features, to be marketed on an ultimate cost basis, and who has produced results in this field, desires connection where competitive sales methods, with devices of merit, have not proven hitherto entirely satisfactory. Salary $4000. E-360.

SUPERINTENDENT. American, married, graduate mechanical engineer, age 36, strong disciplinarian, successful handler of men, well up on efficiency, rate setting, cost accounting and modern shop management. High-grade foundryman and mechanic with six years' engineering and six years' plant executive experience, desires change along machine-shop or foundry lines. At present employed. E-361.

MECHANICAL ENGINEER AND SALES EXECUTIVE. Graduate engineer, B. S., in University of Pennsylvania. Nine years' experience; age, 30; one year experience with public utility, and eight years with former subsidiaries of Standard Oil Company, as representative engineer at Washington, in Government contracts; and later sales manager of middle eastern states. Entire experience based on engineering development and study of industries with object of coöperation with sales department efforts. Author and editor in industrial oil and lubrication problems. Prefer location in Philadelphia. Do not object to some traveling. Salary $4000-$5000. Married. E-362.

COSTS AND ECONOMICS. Stevens graduate, with nine years' experience in estimates of construction costs, appraisal and application of engineering economics to plant construction. For last three years in charge of office handling this class of work for public utility company; having the direction of engineering assistants. Will consider proposition from an industrial or commercial concern offering larger opportunities. E-363.

MEMBER WOULD TEACH MECHANICAL ENGINEERING. Graduate M.E., 40, for twelve years instructor and professor in one of the large technical schools, eight years engineering practice, at present an executive engineer in large corporation, will consider joining the faculty of high-grade engineering school or university as head of department; nothing less considered. Middle West preferred. E-364.

ADVERTISING, EDITORIAL OR EXECUTIVE POSITION desired by Cornell graduate engineer 39 years old. Long experience, much of it managerial, in publication and publicity work in mechanical engineering, electrical, iron and steel, machinery, power-plant and automobile fields. Adept letter writer and tactful in dealing with subordinates and customers; good systematizer and organizer. Prefers position in or near New York where talents can be applied in sales-promotion work. E-365.

SUPERINTENDENT OF POWER OR CHIEF ENGINEER, 12 years' experience with most complicated operating conditions of street railway, lighting and power, high-tension transmission, and steam heating. Specialized in economic combustion of coal and boiler-room problems. Available June 1. E-366.

ELECTRICAL ENGINEER in War Department. Age 39; 15 years' experience covering all branches of mechanical and electrical engineering for industrial and power plants, electrical distribution systems, tests, investigations and reports. Can be released from present service on short notice. E-367.

MECHANICAL ENGINEER. Graduate of University of Wisconsin, M.E. degree. American,

32 years old and married. Experienced in design, specifications and construction of steam-power plants, heating and ventilating apparatus, economical operation both in generation and utilization of steam. Eight years in steam engineering, both consulting and operating. At present superintendent of steam power in the several mills of large paper and pulp company, but desire position with consulting engineer or in consulting capacity with large company. Prefer Middle West. Salary $4000. E-368.

PLANT MANAGER, broad experience with large organizations. Active and progressive executive with successful record in handling labor. Practical knowledge of up-to-date manufacturing in all its branches. Experience in the manufacture of special machine tools, electrical machinery, motors and parts. Only high-grade connections will be considered. American, age 42. E-369.

MANAGEMENT ENGINEER, age 29, assistant to works manager or engineer in charge of efficiency department. Eight years' experience in manufacturing of small, interchangeable parts, machine-screw products and stampings. Thorough layout, planning, scientific time study, speeds, feeds, and general scientific management. Can get out accurate work at minimum cost. E-370.

SALES ENGINEER. Mechanical engineering graduate with executive and administrative ability, machine-shop and drafting-room experience. At present army officer returned from overseas awaiting discharge. Knowledge of French. Location foreign or domestic. Salary $2500. E-371.

SHOP EXECUTIVE, age 36; good organizer and leader of men. Apprenticeship as machinist; can design and build, tools, jigs and fixtures for the rapid production of all kinds of work. Thoroughly acquainted with printing-press work, automobiles, paper machinery and building machine tools. E-372.

MECHANICAL AND ELECTRICAL ENGINEER. Graduate mechanical engineer, University of Illinois. Extensive electrical engineering experience. Age 32 years, married. Now assistant professor of electrical engineering at prominent eastern university, desires connection with mid-west engineering school. Capable of taking charge of department. Minimum salary $3000 per year. E-373.

PLANT, MAINTENANCE OR EQUIPMENT ENGINEER, University of Pennsylvania graduate, 28 years of age, married; six years' experience in design, erection and maintenance of power, gas and industrial plants, desires connection with firm where merits would be appreciated. Salary $3000 per year. E-374.

ASSISTANT TO WORKS ENGINEER OR GENERAL MANAGER OF INDUSTRIAL ESTABLISHMENT. Graduate mechanical engineer, one year's construction experience, and 14 months' experience in various departments of large electric light and power company. Seventeen months' military service in technical capacity. E-375.

PRODUCTION ENGINEER; age 27; graduate mechanical engineer; four years' machine-shop experience; three years in supervising and following up production including routing, planning, and scheduling of work, ordering and estimating of material; one year head inspector. Eastern location preferred. E-376.

MECHANICAL ENGINEER. Age 33; 14 years' experience in production, mechanical and executive positions. At present employed as equipment engineer in a large plant working on Government contracts; held positions as toolmaker foreman, chief draftsman, factory superintendent and process engineer. Available at once. New York or Eastern location preferred. E-377.

MECHANICAL ENGINEER. Broad manufacturing and executive experience combined with practical shop knowledge, wishes to connect with manufacturers desiring assistance in managing, organizing, designing and installing manufacturing processes, planning, scheduling, routing work, dispatching, store keeping, inspection, and standardization of processes, quality, and instructions. Method is to improve and coöperate with present organization, rather than to inaugurate entirely new systems. E-378.

PLANT MANAGER, 17 years' successful experience as chief engineer, general superintendent and manager of plants manufacturing medium and heavy machinery. Technical graduate, good organizer, familiar with costs and accounting, experienced in quantity production. Appreciation of necessity of coöperation between manufacturing, commercial and financial branches of business. Competent man for large plant. At present employed, and interested only in position requiring experience, skill and hard work. E-379.

MANAGER, OR PRODUCTION ENGINEER; American, 26 years' practical experience, covering steam and internal-combustion engines, standard, marine and tractor types, locomotives, electric motors and generators, mining machinery, gas producers, steam and power pressure, vacuum pumps, patent models, special machine tools, milking machines, separators; munitions, factory building, plant layout, routing, tool and jig design for rapid, accurate production with unskilled labor a specialty. E-380.

MECHANICAL ENGINEER. At present employed as an Industrial Engineer. Age 29, married, desires executive position; 13 years' experience as machinist, draftsman, equipment engineer, on both tool and development work; experience covering telephones, electrical apparatus, linotype, talking machines, dictaphones and military rifles. E-381.

SUPERINTENDENT OR PRODUCTION ENGINEER, age 44. Mechanical engineering graduate, 16 years' experience in industrial engineering lines, 8 years with present employer in supervision of rate setting, production planning, costs, pay roll, shop accounting, etc., for shop employing 600 to 900 people. Position in which an interest in business could be obtained preferred. Location Chicago. E-382.

MECHANICAL ENGINEER. Experienced in power station and industrial plant design and developments, in important and responsible positions. Desires permanent position with consulting engineers or as plant engineer with manufacturing concern. E-383.

GRADUATE UNITED STATES NAVAL ACADEMY, at present stationed in China. Would like to get in touch with firms who are either now operating or who contemplate starting in any part of the Far East. Honorable resignation from the U. S. Navy, age 35, married; six years' civilian executive engineering experience, followed by enrolment in U. S. Naval Reserve Force. E-384.

MECHANICAL ENGINEER. Age 32, married. Manager and executive, desires position of responsibility. Speaks several foreign languages, willing to go to South America, abroad, or to the Orient. E-385.

TECHNICAL GRADUATE, now employed, desires position in which a successful experience of 20 years in the application of scientific principles to the design and maintenance of steam and electric railroad rolling stock and other appliances is sought. Have made successful inventions. Only positions with technically trained men considered. Location Eastern Massachusetts. E-386.

UTILITY OPERATOR, Street and Interurban Railways. Recently discharged from overseas service. Connection preferred with consulting engineers on traction work for cities or receivers. Ten years' experience. Age 33. E-387.

ASSISTANT SUPERINTENDENT OR CHIEF INSPECTOR of industrial plant desires position with growing manufacturing firm. American, age 33, married. Technical mechanical engineering education with 12 years' practical experience in design, manufacture and assembly of interchangeable parts including artillery and small arms, ordnance material on mass production as foreman, planner, chief inspector and district supervisor. Now employed at good salary, can furnish best of references. Automobile line preferred. Future, not salary, present object. E-388.

MECHANICAL AND INDUSTRIAL ENGINEER, M. I. T., 1916, desires position with manufacturing concern where considerable increase in production with relatively small increase of cost is desired. Adaptable to requirements and policies of a company, and yet possessing sufficient initiative to handle a difficult proposition without supervision; successfully installed modern methods of management in a large rubber factory. Engineer officer in aviation, honorably discharged. Available at once. E-389.

FACTORY EXECUTIVE. University graduate, for several years production manager with modern concerns, desires connection with modern concern manufacturing product on quantity basis; thorough knowledge and practical experience in modern factory organization, manufacturing methods and industrial relations; at present employed. E-390.

GRADUATE MECHANICAL ENGINEER recently discharged as pilot in the U. S. Air Service desires to locate in New York City as a sales engineer. E-391.

MECHANICAL ENGINEER, technical graduate, age 32, desires position in sales, maintenance or purchasing department of engineering corporation. Ten years' experience in drafting, office and field work pertaining to power plants. Capable of handling men and planning work. Location New York. E-392.

MECHANICAL ENGINEER, graduate University of Pennsylvania. Three years' experience shop drafting and estimating. One year Lieutenant Ordnance Department, U. S. A., experimental work. Age 25. Position desired in Philadelphia or vicinity. E-393.

SUPERINTENDENT, American, with technical education and 23 years' practical experience, 15 as executive, on tools, machine tools, brass, grey and malleable valves and fittings, screw machine products; having successfully filled the following positions: apprentice, toolmaker, general foreman, chief draftsman, mechanical engineer and superintendent. Can guarantee to handle help and get production. E-394.

PRODUCTION ENGINEER: technical education, five years' experience agricultural machinery, gasoline and kerosene engines and tractors. Thoroughly familiar with tools, jigs, and special machine design. Practical machine shop experience. Extensive study in planning department methods including routing, transportation, and scheduling. Age 27. Salary $3000. E-395.

CONSULTING ASSISTANT, a mechanical engineer, out of college four years and experienced chiefly in mechanical research and development lines, possesses originality with sound sense of practical, thoroughness and persistence in the things in which he believes, desires association with consulting engineer of repute as an understudy, and grow and develop in accordance with ability. Location in vicinity of New York, Philadelphia, or Baltimore preferred. Full particulars will be given on request and personal interview arranged. E-396.

MECHANICAL ENGINEER, as assistant to President or General Manager. Cornell graduate, 16 years' practical experience, design and manufacture of small machinery, charge of test work, tool-design' factory layouts and general correspondence; good executive, pleasing personality, very successful in handling men and getting work done with minimum of friction. At present in charge of important work in the ordnance department, but available within the next month. E-397.

EXECUTIVE. Mechanical engineering, Cornell, 1906, instructor in machine design and electrical engineering for five years; assistant professor of machine design at University of Wisconsin four years. Engaged for twenty-seven months on production work in the manufacture of guns and pistols; one year as production engineer. Excellent analyst and harmonizer, loyal, energetic, and conscientious, possesses excellent record and references, has a good personality, thirty-six years of age, and married. Desires connection with a manufacturing concern, in an executive capacity carrying a salary of $3500 to $4500; preferably in or around Connecticut. Versatile and easily adaptable; would consider sales or editorial work. E-398.

MANAGER OF MACHINE WORKS OR SHIPBUILDING PLANT. Graduate mechanical

engineer, want responsible executive position. Experienced in progressive management, modern production, handling and developing men; familiar with ship work and broad class of engineering. All-American, accurate and thorough, with good record in both design and construction of special machinery, machine-shop work, structural steel, power plants, piping, transmission, conveying machinery, and air compressors. Salary $7500 to $9000; only best propositions considered. E-399.

MECHANICAL ENGINEERING GRADUATE with 1½ years' practical machine-shop experience; one year handling crew of men in responsible position; since discharge from army, employed as draftsman with leading boiler manufacturer, desires position with future and opportunity for development of mechanical and executive ability. No snaps considered. Prefer something leading to power-plant or heating and ventilation design, factory superintendent or chief engineer. American, age 28, single. References furnished. Location immaterial. E-400.

MECHANICAL INDUSTRIAL ENGINEER with chemical, metallurgical, construction, and managerial experience, desires connection where initiative and energy are required. Experienced in handling of technical and other help. At present employed. Married, 41 years of age, salary $4000. Eastern location preferred. E-401.

MECHANICAL ENGINEER, technical graduate, with seven years' broad experience in many phases of industrial work including shops, engineering, operating and office methods; familiar with chemical apparatus and order of manufacture of different industries, desires position with engineering or manufacturing firm with sales opportunity. E-402.

MANUFACTURING ENGINEER. Thorough training in manufacturing, capable of analyzing conditions, standardizing operations, setting correct speeds, feeds, and methods of handling work throughout, from raw material to finished product, and getting the maximum output from equipment in use. E-403.

EXECUTIVE MECHANICAL AND ELECTRICAL ENGINEER. Age 35, married, technical college graduate; tact, initiative and executive ability. Experienced in construction, operation and maintenance of stokers, boilers, hydraulic equipment, air compressors, electric generation, transmisston, transformation and utilization, industrial lighting, heating, ventilation and refrigeration. Specialist in economical power production and in the handling of men. Would consider taking entire charge of power proposition for large progressive industrial concern. Eastern location desired. E-404.

TECHNICAL GRADUATE, mechanical engineer, Cornell 1915, experienced in construction and design of instruments, wishes executive position with established small tool or instrument company. At present, chief draftsman in government department. Salary $3000. E-405.

SUPERINTENDENT OR PRODUCTION ENGINEER, discharged army officer of Ordnance Production Department; 28 years of age, married, experienced in design, inspection, experimentation and manufacture of light and medium weight machinery and specialties; familiar with foundry work and up-to-date shop practice. Before entering the Army, superintendent of factory making special small valves. Desire position of executive character as superintendent, manager or Production Engineer where a keen energetic man is needed. Location, Philadelphia preferred. E-406.

ASSISTANT MANAGER or assistant superintendent of industrial plant. Age 43, married, technical graduate; six months concrete inspector in charge for owner; six years assistant engineer in charge of office, inspecting tunnels and houses, studying layout for completed tunnel line and grade; eight years engineer and chief draftsman, in capacity of production engineer in charge of all contracts to completion, manufacturing pier-shed doors, ferry-bridge machinery, electric-car-barn equipment, etc. Salary to start $3000 per year; location preferred, Middle West or South. E-407.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER MAY 19

BELOW is a list of candidates who have filed applications since the date of the last issue of THE JOURNAL. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 141.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by May 19, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

Alabama

JOHNSON, LLOYD, Superintendent, Joubert & Goslin Machine and Foundry Company, Birmingham

California

ROSEDALE, JOSEPH J., Safety Engineer, Industrial Accident Commission of the State of California, San Francisco
SEAGRAVE, D. C., Vice President & General Manager, Pacific Coast Shipbuilding Company, San Francisco

Colorado

MOTT, CHESTER, District Manager, Sullivan Machinery Company, Denver

Connecticut

BRUNETT, ADRIAN L., Mechanical Engineer, Bilton Machine Tool Company, Bridgeport
JOHNSON, BERT E., District Gauge Supervisor, Ordnance Department, Bridgeport
MEDLEY, RALPH, Production Engineer, Locomobile Company of America, Bridgeport
MILES, J. W., Assistant District Gauge Supervisor, Ordnance Department, Bridgeport District Office, Bridgeport
STAHL, CHARLES E., Assistant General Manager, Connecticut Telephone & Electric Company, Meriden

District of Columbia

DICKINSON, JOHN A., Associate Mechanical Engineer, Bureau of Standards, Washington
LA MAR, ALFRED, Lieutenant Colonel, Ordnance Department, U. S. Army, Washington

Georgia

CAROTHERS, ROY E., Sales Engineer, Power Department, Westinghouse Electric & Manufacturing Company, Atlanta

Illinois

CARRICK, GERALD S., President & General Manager, Carrick Engineering Co., Chicago
CLOW, KENT S., Vice President, James B. Clow & Sons, Chicago

Indiana

BRENNAN, ALBERT F., Indianapolis
PARKER, LESLIE O., Mechanical Engineer, Remy Electric Division, General Motors Corporation, Anderson

Kansas

STUNTZ, ROSS M., Assistant General Superintendent, Empire Gas & Fuel Company, Eldorado

Maryland

HAYES, EDWIN P., Mechanical Engineer, Aberdeen Proving Ground, Aberdeen
MOORE, WILLIAM R., JR., President, Moore Engineering Company, Hagerstown
OBERLY, ROBERT S., Lieutenant Colonel, Executive Officer, Aberdeen Proving Grounds, Aberdeen
RANDOLPH, JAMES R., Draftsman, Bethlehem Steel Company, Sparrows Point

Massachusetts

BASSETT, CHARLES E., Industrial Engineer, Cooley & Marvin Company, Boston
FOLEY, ERNEST LEON, Mechanical Engineer, Underwood Machinery Company, Boston
JOHNSON, OSCAR S., President & Manager, The Franklin Machine & Tool Company, Springfield
POND, HAROLD W., Mechanical Engineer, Morgan Spring Company, Worcester
POPE, FREDERICK A., Mechanical Engineer, Worthington Pump & Machine Corporation, East Cambridge

Michigan

DAVENPORT, RANSOM W., Works Manager, Jeffery Dewitt Company, Detroit
OWSTON, CHARLES W., Assistant Vice President, McCord Manufacturing Company, Detroit

Minnesota

SCHENKLE, ARMAND J., Army Inspector of Ordnance, U. S. Government Ordnance Department, Stillwater

Missouri

CHRISTY, WILLIAM G., District Supply Manager, United States Shipping Board, St. Louis
MOOK, EDWARD E., Kansas City

New Jersey

GAMBLE, WALTER W., Chief Engineer, Standard Oil Company of New York, Jersey City
HOWE, ROBERT B., Safety Supervisor, E. I. DuPont de Nemours & Company, Carney's Point
KAPLAN, HARRY, Engineering Draftsman & Designer, Newark Bay Shipyard, Newark
KLEIN, IRVING, Mechanical Engineer, New York Shipbuilding Corporation, South Yard, Camden
KREH, ALBERT, Assistant Works Engineer, Bethlehem Shipbuilding Corporation, Limited, Elizabeth

New York

BLAKE, ALLEN T., Albion
BLISS, WILLIAM L., Chief Engineer, U. S. Light & Heat Corporation, Niagara Falls
BURDEN, WESLEY W., Chief Mechanical Engineer, The Bird-Archer Company, New York
BURN, WALTER P., Publicity Man on Pneumatic Tools, Ingersoll-Rand Company, New York
BURROWS, CHARLES W., Magnetic-Research Engineer, Grasmere, Borough of Richmond
CASE, CHARLES W., Superintendent, Ophula Hill & McCreery Engineers, New York
CASTRO, PETER B., New York
COHEN, MORRIS J., Chief Draftsman, Pyrene Manufacturing Company, New York
CORRIGAN, WILLIAM E., 1st Lieutenant, Ordnance Department, U. S. A., Rochester
DE PRIMA, JOSEPH, Chief Thread Gage Inspector, E. W. Bliss Company, Brooklyn
EHLERT, CARL H. H., Engineering Officer, The U. S. S. Tiger, New York
FITZGERALD, WILLIAM V., Draftsman, John A. Crowley Company, New York
FROST, ROBINSON V., Production Engineer, Ordnance Department, U. S. A. Rochester
GANSFIELD, ALEXANDER, Mechanical Draftsman, Honolulu Iron Works Company, New York

GARDNER, ELSA M., Gauge Inspector, E. W. Bliss Company, Bay Ridge Works, Brooklyn
GOLDEN, SAMUEL, Inventor of Boats & Ships, President, Hullfin Boat Company, New York
GORDON, CONSTANTINE S., Superintendent, The Otter Manufacturing Company, New York
GREYDANUS, SYTZE E., Assistant Engineer Constructor, I. R. T. Company, New York
HASBERG, WILLIAM M., Captain, Chairman Salvage Board, Rochester District Ordnance Office, Rochester
HAWKINS, MASON I., Office of Superintending Construction of Aircraft, U. S. N., New York
HAYWARD, CLARENCE R., Ensign, U. S. N. R. F., New York
HILL, ROBERT H., Designing Draftsman, W. & L. E. Gurley, Troy
HOMMA, KAMEKICHI, Mechanical Engineer, Mitsubishi Company, New York
KATCHER, MORRIS, Assistant Engineer, Raymond Engineering Corporation, New York
KILPATRICK, FRASER B., Treasurer & Mechanical Engineer, W. B. Connor Incorporated, New York
LEDBETTER, JAMES C., Mechanical Engineer & Patent Law, Scientific American, New York
LOUV, JENS F., Senior Assistant Mechanical Engineer, U. S. Navy, Brooklyn
LOWENSTEIN, HERBERT M., Designer, De La Vergne Machine Company, New York
LUCENA, JOSEPH, Superintendent of Gas Distribution, Syracuse Lighting Company, Syracuse
PARKER, EVAN J., President, The Parker Company, New York
RAYNOR, ARTHUR E., Ensign, Engineer Officer, U. S. Navy, Long Island
RHODES, GEORGE I., Manager, Engineering Department, Ford, Bacon & Davis, New York
RUSSELL, WILLIAM J., Assistant to Assistant General Manager, American Cyanamid Company, New York
SCHANCK, HARRY S., Treasurer, Charles F. Ames & Company, Limited, New York
SMILEY, EDWIN, Sales Engineer, Standard Oil Company, New York
SMITH, CLEMENT C., Assistant Engineer, Kings County Lighting Company, Brooklyn
STEPHENS, HAROLD A., Designing & Constructing Engineer, U. S. Dye Extracts Company, L. I. City
TONJES, CARL, Fire Protection Engineer, Underwriters Bureau of Middle & Southern States, New York
UGGLAS, CARL G., Vice President, A. Lilius Company, New York
WINTER, CHARLES N., Associate Editor, Simmons Boardman Publishing Company, New York
WIRTH, GUSTAVE A., Chief Draftsman & Assistant Engineer, C. J. Tagliabue Manufacturing Company, Brooklyn

Ohio

GARMS, LEVI J., Field Assistant to Army Inspector of Ordnance, U. S. Army, Cleveland
HUTCHINSON, ARTHUR E., District Mechanical Superintendent, The Austin Company, Cleveland
LIPPS, WILLIAM L., Junior Engineer, Henry L. Doherty & Company, Toledo
MUSSER, HARRY L., Sales Engineer, The McMyler Interstate Company, Bedford
NOE, OSCAR P., Publicity & Sales, R. K. LeBlond Machine Tool Company, Cincinnati
NORTON, ALLEN B., Manager Liberty Plant, The Aluminum Castings Company, Cleveland
OESTERLEIN, CHARLES D., Vice President, Oesterlein Machine Company, Cincinnati
RICHARDSON, HARVEY J., Works Engineer, Berger Manufacturing Company & Stark Rolling Mill, Canton
ROSS, FRANK P., 1st Lieutenant, Ordnance Department, U. S. A., Cincinnati
SUTTON, FRANK W., General Superintendent, Dayton Wright Airplane Company, Dayton
THOMAS, LOTON, General Foreman, Machine Tool Department, The American Laundry Machinery Company, Cincinnati
VERITY, CALVIN W., Assistant to General Superintendent, American Rolling Mill Company, Middletown
WOLCOTT, PERRY E., Aero Mechanical Engineer, McCook Field, Dayton

Oklahoma

HUTCHINSON, N. M., Engineering Research Department, Empire Gasoline Company, Bartlesville

Pennsylvania

BAILEY, CHARLES E., Chief Engineer, The Wolfe Company, Chambersburg
BAKER, JOHN A., Assistant General Superintendent, Mesta Machine Company, Pittsburgh
CRONEY, P. ALFRED, Plant Engineer, The Congoleum Company, Marcus Hook
DELANEY, LOUIS A., Mechanical Engineer, Marlin Rockwell Corporation, Philadelphia
DICKSON, THOMAS J., Assistant to Works Engineer, Fels & Company, Philadelphia
ELLIS, GEORGE J., Assistant Master Machinist, Small Arms Department, Frankford Arsenal, Philadelphia
EMERY, WALDO M., Assistant Engineer, Emergency Fleet Corporation, Philadelphia
EUSTON, EDWIN, President, Euston Process Company, Scranton
EWELL, FRANK O., Charge of Machines Used on the State Highways of Pennsylvania, Harrisburg
FERGUSON, ROBERT B., Chief Draftsman, Power & Plant Department, Wm. Cramp & Sons Ship & Engine Building Company, Philadelphia
FINN, STEPHEN M., Assistant Chief Engineer, American Engineering Company, Philadelphia
HEILMAN, RUSSELL H., Reasearch on Method of Heat Flow, Mellon Institute of Industrial Research, Pittsburgh
HUTCHINSON, WILLIAM S., Manager Contract & Construction, Bethlehem Fabricators, Incorporated, Bethlehem
McAULIFF, PIERCE J., Assistant Manager Ship Construction, Emergency Fleet Corporation, Philadelphia
MARKS, HERBERT E., Chief Draftsman, John B. Semple & Company, Sewickley
MASON, MAYNE S., Industrial Fellow, Mellen Institute, Pittsburgh
OSBORNE, HARRY, Chief Draftsman, A. C. Wood, Philadelphia
PRESTWICH, SYDNEY, Charge of Equipment Layouts & Special Automatic Machine Design, Frankford Arsenal Philadelphia
SETZER, WALTER C., Instructor, University of Pennsylvania, Philadelphia
SHARPLES, DAVID T., President, The Dairy Specialty Company, West Chester
SIMPSON, FRANK R., Engineer & Draftsman, Central Pennsylvania Lumber Company, Williamsport
TENNEY, GEORGE C., Vice President & General Manager, International Money Machine Company, Reading
WYMAN, EDWARD E., Assistant to the President, Gellert Engineering Company, Philadelphia

Tennessee

BUTLER, FRANK A., Engineer for Power Sales Department, Orgill Brothers & Company, Memphis

Virginia

BEAMAN, HARRY E., Boiler House Engineer, DuPont Chemical Company, City Point

Washington

HARRINGTON, EDMUND J., Civilian Assistant Shop Superintendent, Puget Sound Navy Yard, Bremerton
MUDGE, JAMES D., Member of Mechanical Engineering Faculty, University of Washington, Seattle

West Virginia

EDMUND, HARVEY W., Acting Mine Manager, Illinois Commercial & Mining Company, Ethel

Wisconsin

CORWIN, LLOYD A., Master Mechanic, Wisconsin Motor Manufacturing Company, Milwaukee

China

WILSON, HAROLD B., Mechanical Engineer, The Kwang Tung Electric Supply Company, Limited, Canton

Cuba

BURGESON, ERNEST B., Chief Electric Engineer, Cuba Cane Sugar Corporation, Pina, Camaguey

France

LARER, GEORGE N., 2nd Lieutenant, Supply Officer, Air Service, U. S. Army, A. E. F.

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE

Massachusetts

PELLISSIER, GEORGE E., Assistant General Manager & Chief Engineer, Holyoke Street Railway Company Holyoke

New York

OSTRANDER, ALLEN E., Chief Mechanical Engineer, American Car & Foundry Company, New York

Pennsylvania

KING, ALVIN W., Sales Manager, Nelson Valve Company, Philadelphia

PROMOTION FROM ASSOCIATE-MEMBER

Arizona

HARDY, NORMAN G., Chief Mechanical & Electrical Engineer, The Arizona Copper Company, Limited Clifton

Connecticut

STEPHEN, CHARLES W., Mechanical Engineer & Assistant Works Manager, Pratt & Cady Company, Incorporated, Hartford

Kansas

SULENTIC, STANISLAUS A., Supervising Engineer, Empire Gas & Fuel Company, Eldorado
MOYER, MALCOLM B., President and Manager, Moyer Manufacturing Co., Montevideo

Missouri

TACCHELLA, ADOLF A., Engineer, Busch Sulzer Brothers, Diesel Engine Company, St. Louis

Pennsylvania

GRANT, ALBERT W., JR., Gas Engineer, The Koppers Company, Pittsburgh
KULLING, OTTO W., Consulting Engineer, Philadelphia

PROMOTION FROM JUNIOR

District of Columbia

SPARROW, STANWOOD W., Associate Mechanical Engineer, Bureau of Standards, Washington

Illinois

VANIMAN, R. LAWRENCE, President, Produce Terminal Corporation, Chicago

Iowa

MEEKER, WARREN H., Professor of Mechanical Engineering, Iowa State College (Reinstatement), Ames

New Jersey

FINE, BERNARD M., Chief Draftsman, International Arms & Fuze Company, Bloomfield

New York

REYNOLD, HERBERT B., Mechanical Research Engineer, Interboro Rapid Transit Company, New York

Pennsylvania

BLAISDELL, ALLEN H., Instructor in Mechanical Engineering, Carnegie Institute of Technology, Pittsburgh

Rhode Island

GLASS, WILLIAM C., Superintendent of Printing Machinery Department, Woonsocket Machine & Press Company, Incorporated, Woonsocket

France

LIGHTOWLER, GEORGE R., 1st Lieutenant, Office of the Chief Ordnance Officer, U. S. A. A. E. F.

SUMMARY

New Applications	124
Change of Grading:	
Promotion from Associate	3
Promotion from Associate-Member	6
Promotion from Junior	8
Total	141

In Two Sections—Section Two

Volume 41 Number 6

MECHANICAL ENGINEERING

THE JOURNAL OF THE AMERICAN
SOCIETY OF MECHANICAL ENGINEERS

June, 1919

Society Affairs

A Record of the Current Activities of the Society, Its Members, Council, Committees, Sections and Student Branches; and Affairs of Interest to the Membership

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
29 West 39th Street, New York

Coming Meetings

Of course you are planning to attend the Spring Meeting at Detroit, June 16 to 19, with Headquarters at Hotel Statler. See the interesting program in Section I of this issue of MECHANICAL ENGINEERING, page 553.

June 5. Hartford Branch, Connecticut Section. Hiram Percy Maxim—"Sound" Smoker.

June 6. Meriden Branch, Connecticut Section, Winthrop Hotel. Annual meeting. Election of officers. Luncheon.

June 10. Cleveland Section, Chamber of Commerce. All-day meeting. Excursion and addresses.

New York Section. Discussion of Society's Aims and Organization, in connection with the report of the Committee.

Attractions En Route to Detroit Spring Meeting

A CHOICE is offered of a visit to Buffalo or Cleveland, on the Saturday preceding the meeting at Detroit which begins on Monday.

Those going to Buffalo will leave by lake steamer Saturday evening, calling at Cleveland so as to bring together both groups.

A stop will be made at historic Put-in-Bay, where Commodore Perry fought and won his great battle.

Detroit will be reached early Sunday evening.

Those who participate in this excursion will not only have an enjoyable trip but will arrive at Detroit acquainted with a number of people attending the Spring Meeting and will find their general interest in the entire convention thereby greatly enhanced.

ITINERARY—JUNE 13-20

Via Buffalo. Special cars and trains will leave **Friday, June 13,** from New England points, New York, Washington, Baltimore and Philadelphia, arriving at Buffalo Saturday morning. The Buffalo Section will meet the party with automobiles and provide entertainment with excursions throughout the day, affording opportunity also for special side-trips, such as Gorge Route, Niagara Falls. Leave by lake steamer at 9:00 p.m., arriving at Cleveland Sunday morning at 7:30 a.m., where the party will join with those going—

Via Cleveland. Special cars and trains will leave Philadelphia, Baltimore, and Washington, Pittsburgh, Cincinnati, Indianapolis, New England points and New York, **Friday, June 13,** arriving at Cleveland Saturday morning. Automobiles will meet the various trains, taking the parties to the Chamber of Commerce, headquarters of the A. S. M. E. Cleveland Section. Headquarters of visitors will be at the new Hotel Cleveland on the Public Square, convenient to the Chamber of Commerce Building. There will be a luncheon followed by an excursion to points of interest and a dinner meeting. Sunday morning the party will join the Buffalo contingent en route to the Spring Meeting going—

Via Put-in-Bay. The boat will stop at Put-in-Bay, where an auto ride will be taken and dinner served, the boat leaving at 5:30 p.m. for Detroit and arriving there at 8:00 p.m. Automobiles will be provided to hotels.

PULLMAN-STEAMER STATEROOMS AND HOTEL ROOMS SHOULD BE RESERVED AT ONCE

The headquarters for the meeting will be at the Hotel Statler, where reservations should be made as early as possible. The following rates are given by the Hotel Committee:

Make your reservation promptly.
Hotel Statler: $2.00 to $2.50 (limited in number)
3.00 (a few available)
3.50 (plenty available)
5.50 and up, rooms with double beds (plenty available)
Hotel Pontchartrain: $2.00 up (rooms getting scarce for June)
Hotel Tuller: $1.75 up (rooms scarce for June)

YOUR PART

Please fill out and mail at once the Reply Blank below. These replies will make it possible to develop the ideas submitted herewith, make reservations for railroad and steamer accommodations, etc. Buy your tickets (railroad and Pullman) in your home city, saying you are going with "A.S.M.E. party." If going via Buffalo it will be necessary to get at once through A.S.M.E. Headquarters your steamer accommodations. Two hundred staterooms are reserved. Act quickly if you desire one.

RAILWAY FARES INCLUDING TAX

FROM	*To Buffalo*	*To Cleveland*	*To Detroit (direct)*
New York	$14.23	$19.90	$23.30
Boston	16.11	22.01	24.28
Philadelphia	11.99	15.58	20.90
Pittsburgh	7.91	4.28	9.66
Buffalo		5.96	9.07
Cleveland	5.96		5.38
Detroit	9.07	5.38	
Chicago	16.98	11.08	8.81
St. Louis	22.49	17.17	16.01
San Francisco	86.88	80.18	79.60
Baltimore	12.48	14.64	19.96
New Orleans	42.25	35.00	36.80
Birmingham	28.04	23.37	23.87
Atlanta	27.86	23.20	23.71
Washington	13.78	14.04	19.41
Worcester		20.57	22.84
Providence	16.15	19.57	22.84
Toronto	3.91	9.98	8.10
Erie	3.18	3.11	8.49

A.S.M.E., 29 West 39th St., New York.

Without obligating myself I am furnishing the following information to enable plans for an excursion to the Spring Meeting to be developed:

I expect to attend with { ....lady / ....gentleman } guests, and will require { ....upper berth.....section / ....lower berth....drawing room }

in Pullman sleepers from.....to { Buffalo / Cleveland } and { ....upper berth..... / ....lower berth....stateroom for 2 }

from Buffalo to Cleveland. I would like to go with the.....Section.

Name.....

Street and No..... Town and State.....

SOCIETY AFFAIRS

Affairs of Interest to the Membership — Secretary's Letter — Council Notes — Citations for Meritorious Services — Meetings of Local Sections — Employment Bulletin —Candidates for Membership

The Secretary's Letter

OF the photographs, souvenirs and letters written to and received from distinguished persons, rulers, etc., on exhibition now with the Roosevelt Trophies at Columbia University, the letter from Mr. John Hay, Secretary of State, is the most impressive. It was written just after the death of President McKinley and the assumption of the presidency by Mr. Roosevelt. I quote from this letter dated September 15, 1901, as follows:

* * * and even from the depth of sorrow where I sit, with the grief for the President mingled and confused with that for my boy, so that I scarcely know hour to hour the true source of my tears, I do still congratulate you, not only on the opening of an official career which I know will be glorious, but upon the vast opportunity for useful work which lies before you. With your youth, your ability, your health and strength, the courage God has given you to do right, there are no bounds to the good you can accomplish for your country and the name you will leave in its annals.

How prophetic was this letter!

To those who have been following the Secretary's letters, month by month in MECHANICAL ENGINEERING, it may be of interest to get the ideals of President Roosevelt which were expressed in The Strenuous Life published in 1900 as follows:

I wish to preach, not the doctrine of ignoble ease, but the doctrine of the strenuous life, the life of toil and effort, of labor and strife; to preach that highest form of success which comes, not to the man who desires mere easy peace, but to the man who does not shrink from danger, from hardship, or from bitter toil, and who out of these wins the splendid ultimate triumph.

and from one of Roosevelt's earlier addresses given in 1894:

Every man who wishes well to his country is bound in honor to take an active part in political life.

You may ask, "What has this to do with a professional engineering society?" It is this. That every member of a profession, whether it be medical, legal, engineering or other profession, is a man set apart from those of other callings. If we as a nation, and the engineering profession as a profession, are to benefit from the world strife through which we have successfully emerged, it must be by greater devotion and a higher aim. If we merit the role of victor, we must show by example our higher virtues.

The specific steps which I have encouraged are that every professional man, and by that term I include the architects and chemists, and other members of technical callings, become a member of the local engineering society, and become identified with its activities, which we are confident will sooner or later be identified with the technical features of the public work of the community in which the professional society is located. We are confident further that the membership in the national society will follow within a reasonable time, and that the more loyal and efficient the men are in the local societies, they will then be correspondingly active and come to the front in the national societies.

There is a development going on whereby the national societies are getting closer together in all activities in which they may jointly participate and through some joint body like Engineering Council it is inevitable that there will eventually be a relation established with every local society throughout America and thus we will through our expanding activities, such as the opening of the Washington office of the Engineering Council, participate in the affairs of the Nation in the same manner that I advocate in the community.

CALVIN W. RICE,
Secretary.

Council Notes

AT the meeting of the Council held in New York on April 18, 1919, the following were present: M. E. Cooley, *President*, presiding: *Past-Presidents*, Ira N. Hollis, D. S. Jacobus, and Jesse M. Smith (also *Chairman Committee on Constitution and By-Laws*); *Vice-Presidents*, Fred R. Low, Spencer Miller, Henry B. Sargent; *Managers*, Robert H. Fernald, D. Robert Yarnall (also *Chairman Local Sections Committee*), Chas. L. Newcomb, Charles Russ Richards, Frank O. Wells; *Treasurer*, William H. Wiley; *Committee Chairmen*: W. E. Symons, *Finance;* D. S. Kimball, *Meetings and Program;* S. D. Collett, *Membership;* Arthur M. Greene, Jr., *Chairman Research Committee;* Louis E. Strothman, representative of the Society with the President on the National Industrial Conference Board; Arthur L. Williston, *Chairman Increase of Membership Committee,* and Calvin W. Rice, *Secretary.*

SPECIAL ORDERS

Hutton Memorial Committee. Past-President Jesse M. Smith, Chairman of the Committee, presented for private view the bronze placque of Past-President and Honorary Secretary Frederick R. Hutton.

The Council expressed their commendation of Mr. Brenner's achievement in securing so satisfactory a likeness and their appreciation of the personal attention of the Committee.

Mr. Smith announced that the Committee would superintend the erection of the placque in the rooms of the Society.

Secretary's Trip. The Secretary gave an oral report of his trip to the Local Sections and spoke with enthusiasm of the state of idealism in which he found the engineers in all parts of the United States. He asked the Council to accept responsibility to carry out the magnificent work which is theirs to do, of establishing a higher plane of endeavor for the professional society than that of holding technical meetings and efficiently publishing accounts of those meetings—namely, that the primary object of a professional society be to devote its technical work to the public. All its present work should be secondary. The Secretary quoted from Glenn Frank's article in the April *Century;* from President Winchell of the Mining Engineers; President Kimball of the American Institute of Architects, and from Vice-President Spencer Miller, to show consensus of opinion.

The Council recorded its vote of thanks to the Secretary for the splendid constructive work which he has been doing, and the hearty approval of the Council for the action which he had taken in the several cases of calling together the representatives of the profession and establishing in various centers both joint committees of all branches of the profession and local committees of this Society.

Increase of Membership. Prof. Arthur L. Williston, Chairman of the Increase of Membership Committee, discussed the work of his committee, laying particular emphasis on the possibilities of the Local Sections coöperating by developing personal contact with prospective applicants through local meetings and excursions. He called particular attention to the combined human and professional side required in this work, to give the proper impression at the outset, and discussed methods employed and being developed by his committee for this purpose. He concluded with a conception of an administrative staff to develop this activity.

Research Committee. Professor Greene, Chairman of the Research Committee, outlined the plans of this committee being developed through the columns of MECHANICAL ENGINEERING, enumerated the results accomplished, and described special investigations by sub-committees now under way.

The President announced that the appointment of Professor Greene on the Engineering Division of the National Research Council was with the purpose of tying the work of the Society's committee in with the work of this Division.

National Industrial Conference Board. The President reported that he had associated with himself as the representative of the Society on the National Industrial Conference Board, Louis E. Strothman, of Milwaukee, who gave an interesting review of the subjects covered by the Board in its work, and expressed the opinion that it was most important and well worth while for the Society to have decided to participate in the work of the National Industrial Conference Board.

Employment. Major E. C. Church, U. S. A., speaking for Col. Arthur Woods, Special Assistant Secretary of War, in charge of the Eastern Department of the United Council on Reëmployment of the War Department, presented to the Council the employment problems now before him.

The Council directed that the Secretary coöperate with Major Church in every way possible, and expressed itself as in full sympathy in the present emergency of doing everything to place the men returning from war service and assisting in getting them back into civilian work.

Standing Committees of Administration

Finance. Mr. Symons, Chairman, presented a revised statement of the income and expenditures for the current fiscal year.

The Finance Committee, in conjunction with the Treasurer, was authorized to consider the reinvestment at a higher rate of interest, of the funds of the Society now in the savings banks.

It was also voted to subscribe $10,000 in the United States Fifth Liberty Loan.

Meetings and Program. Professor Kimball, Chairman, reported on the plans for the Detroit Meeting and that the program was practically completed. At his request, several suggestions of speakers were offered by the members of the Council.

Membership. Mr. Collett, Chairman, reported that the committee's work was up to date, and that in consequence the work of the Increase of Membership Committee could be encouraged with advantage.

Local Sections. Mr. Yarnall, Chairman, reported that for some time the Local Sections had been working out a plan which would bring into their work a normal and natural way of increasing the membership, through direct contact with the Local Sections committees.

A meeting had been held in Rochester, N. Y., from whence a formal petition for a Local Section was expected; Schenectady, Troy and Albany have directed a committee to proceed to prepare a petition for a Section, to be known as the Tri-City Section. The committee planned to make trips to Baltimore, Washington and Richmond.

Professional Committees

Boiler Code. Interpretations Nos. 215 through 227 were approved and ordered printed in MECHANICAL ENGINEERING, as heretofore.

Power Test Codes. The recommendation of the Executive Committee of the Power Test Codes Committee of a compilation of a Standard Table of Physical Properties of Steam to accompany the Codes or to be furnished by the Society as a separate publication was approved.

Appointments by the President

Commercial Engineering Conference. The President announced the appointment of Dean Sackett, of Pennsylvania State College, to represent the Society at the Commercial Engineering Conference called in Washington, March 31, 1919.

War Service Committee. Major Fred J. Miller, Chairman, Major W. B. Gregory, and Lieut.-Col. J. J. Swan, were appointed as a committee to record the history of the participation of the members of the Society in the World War. This committee was also asked to be responsible for a memorial service for those who made the supreme sacrifice.

National Research Council, Engineering Division. Dr. D. S. Jacobus was announced as the second appointee to represent the Society.

Adjournment was taken to meet in New York on May 16.

CALVIN W. RICE,
Secretary.

Committee Meetings and Reports

The Committee on Aims and Organization is to report to the Council at its meeting in connection with the Spring Meeting.

The Committee on Steel Roller Chains, which is a joint Committee with the Society of Automotive Engineers, is to hold a meeting at the time of the Spring Meeting.

The Committee on the Rehabilitation of the Blind is to have a meeting at the same time.

The Main Committee and all the Individual Committees of the Power Test Codes are to have a meeting in New York at the Society's rooms on June 2, 1919.

Two of the sub-committees of the Research Committee, the Committee on Bearing Metals and the Committee on Lubrication, are to submit reports for the Spring Meeting.

The Committee on Local Sections is to meet in connection with the Spring Meeting.

The Regular Nominating Committee will meet in connection with the Spring Meeting.

National Industrial Conference Board

The Council recently received a request from the National Industrial Conference Board that the Society participate in the work of this Board which was organized in 1916 to unify and centralize the efforts of industrial associations in studying and solving the economic problems of industry and to take constructive action in respect to issues vital to the welfare of all.

The Council acted upon this request favorably and the delegates appointed to represent the Society are President M. E. Cooley and Mr. L. E. Strothman, of Milwaukee. Mr. Strothman reported at the last Council meeting (see Council Notes, page 1).

The Board will soon send out to every member of the Society a brochure descriptive of the scope of its work which will also suggest how members may benefit from the Society's membership.

Applications for Membership

The following extracts from the Constitution of the Society give the requirements for membership in the organization. Applications for membership should be made on a special form which will be furnished by the Secretary upon request:

C 9 A Member shall be an Engineer or Teacher of Applied Science of thirty-two years of age, or over, and shall have been in the active practice of his profession for at least ten years and in responsible charge of important work for five years, and shall be qualified to design as well as to direct engineering work. Fulfilling the duties of a professor of Engineering who is in charge of a department in a college or school of accepted standing shall be taken as an equivalent to an equal number of years of active practice. Graduation from a school of engineering of recognized standing shall be considered as equivalent to two years of active practice.

C 10 An Associate shall be thirty years of age or over. He need not be an Engineer, but must have been so connected with some branch of Engineering or Science, or the Arts, or Industries, that the Council will consider him qualified to coöperate with Engineers in the advancement of professional knowledge.

C 11 An Associate-Member shall be a professional engineer not less than twenty-seven years of age, who shall have been in the active practice of his profession for at least six years, and who shall have had responsible charge of work as principal or assistant for at least one year. Graduation from a school of engineering of recognized reputation shall be considered as equivalent to two years' active practice.

C 12 A Junior shall be twenty-one years of age or over. He must have had such engineering experience as will enable him to fill a subordinate position in engineering work, or he must be a graduate of an engineering school.

The list of candidates for membership is posted each month in the Society Affairs Section of MECHANICAL ENGINEERING, and it is one of the duties of members to scrutinize the list of candidates and advise the Secretary of any objections.

Skilled Mechanics as well as Professional Engineers to be Assisted to Employment

THE ENGINEERING SOCIETIES TO ASSIST THE JOINT EMPLOYMENT SERVICE OF FEDERAL, STATE AND CIVIC BODIES.

Attention is brought to the members of the Society of the large number of exceptionally capable men now available for employment both in professional work and in the industries of the country. The names and records of these men may be obtained through Mr. W. V. Brown, manager of the Engineering Societies Employment Bureau at 29 West 39th Street, New York, and they comprise not only engineers but mechanics with a wide and varied experience.

The army discipline has not only made these men quicker thinkers but also more willing workers. The whole result of their training has been conducive to regular habits, steadying them and fitting them the quicker to meet emergencies. Further, the military instruction which the men have received has increased their power of concentration. It cannot be brought too strongly before the employers of skilled labor that the employment of discharged soldiers and sailors will be advantageous to the employer and economically beneficial to the country.

This work is in line with that which has been done during the war by the four national engineering societies—civil, mining, mechanical and electrical, under the auspices of the American Engineering Service Committee of Engineering Council, rendering valuable aid to the Government by placing many technical men in the Army, Navy and industries of the country at a time when they were greatly needed. With the signing of the armistice this work naturally ended, but the greater problem of returning to civil employment the discharged soldier and sailor at once presented itself, and is daily growing graver and more urgent. To meet this problem, these four societies organized the Engineering Societies Employment Bureau of Engineering Council with the secretaries of the societies as directors.

To this end every member of the Society is requested to take up the matter actively and to forward either to the Secretary of the Society or to the Employment Bureau detailed opportunities for placing men in any of the industries in which they are acquainted.

News Wanted of Lieut. Wm. H. Stuart

The American Red Cross, 222 Fourth Ave., New York City, is using every effort to aid in locating Lieut. William H. Stuart, son of Duncan C. Stuart, of 12 Maple Street, Oneonta, New York, and will appreciate any information that can be secured relative to his whereabouts.

Lieut. Stuart is 27 years of age. He arrived from overseas service in January and was last seen in New York City on January 18, at 7.30 p. m. He is a graduate of Colgate, Class of 1914, and took two years' post-graduate work at Brooklyn Polytechnic Institute. He is 5 feet 8 inches tall, has dark brown hair, blue eyes, a ruddy complexion and a brown mole on the left side of his nose. He has three gold service chevrons on his sleeve if in uniform. When last seen he was wearing spiral puttees.

Citations for Meritorious Services

Lieut.-Col. Frederick W. Green, Transport Corps, U. S. A., Mem.Am.Soc.M.E., has been awarded the Distinguished Service Medal in recognition of his services as superintendent of the port of Brest, where, the citation says, he perfected an organization which was competent to unload the largest ships in a surprisingly short period of time. The citation reads:

"For exceptionally meritorious and distinguished services. As superintendent of the port of Brest he organized the task expeditiously and with great ability. Without previous organization or personnel to aid him, and confronted with many serious obstacles he, by sheer force of will, supported by untiring energy, undertook a new work and created the organization which was competent to unload the largest ships in a surprisingly short period of time. His service was most valuable to the A. E. F."

It is with pleasure that we give below an announcement regarding one of our junior members which has been received from France:

Cited in special orders by Major-General O'Ryan for meritorious services:

"Sgt. Elias Schlank, 107th Infantry, U. S. A., for exceptional courage and devotion to duty in rendering first aid to the wounded under heavy enemy fire. This in the Dickebusch Lake sector, Belgium, August 1918, and in the battle of the Hindenburg Line, September 27-30, 1918."

AMONG THE LOCAL SECTIONS

THE Council at its meeting on May 16 approved petitions from the members in the following territories: The State of Virginia, with headquarters at Richmond; Eastern New York, comprising those members located in Albany, Amsterdam, Chatham, Cohoes, Glens Falls, Hudson, Schenectady, Troy, Waterford, and Watervliet, with headquarters at Schenectady; the territory within the radius of thirty miles of Rochester, with headquarters at Rochester. This makes a total of twenty-seven sections of the Society, one of which has five branches, making thirty-one cities in all where meetings of the Society are regularly held. Thus far during this year six Sections have been added to the activities of the Society and four other centers are now considering making application, and these may be made effective before the summer.

Section Luncheon for Council. The Council has been meeting in New York for many years but there has never been an opportunity for the members to meet with them. The New York Section accordingly arranged an informal luncheon on Friday, May 16, at which a goodly number of the members of the metropolitan district had the opportunity of meeting the Council and hearing a very interesting address by the President.

Sections Luncheon at Spring Meeting. It has been arranged for representatives of all Sections to meet with the Council on Tuesday, June 17, at Hotel Statler in Detroit. This luncheon has been made a feature of the Spring Meeting for several years, and gives the membership of the Society, through its regularly elected representatives on the various Sections Committees, an opportunity to present their views directly to the members of the Council.

Sections Excursion to Detroit. Arrangements have been made whereby a number of the Sections will coöperate in an excursion to the Spring Meeting. Complete details will be found in another portion of this section of MECHANICAL ENGINEERING.

Visits to Sections by Committee. The Committee on Local Sections visited the Baltimore and Washington Section on April 29 and 30 respectively. The party was made up of Mr. D. Robert Yarnall, *Chairman;* Prof. James A. Hall, and Ernest Hartford, *secretary.* The members of the committee explained to the Sections the aims and ambitions which they have for the development of this very important branch of the Society's activities. The meeting of the Washington Section which is the first to be held since its organization was unusually interesting and the three

papers presented will be subsequently printed in MECHANICAL ENGINEERING.

New Headquarters for Milwaukee Section. The Milwaukee Section has just completed affiliations with the Milwaukee Athlic Club whereby they have the privilege of meeting in their new Club House. This promises to create even greater activity on the part of the members of the Section, as was evidenced at the meeting held on April 29 when over 400 attended.

Sections Meetings

BIRMINGHAM:
May 23. Informal banquet.

BOSTON: (With Boston Society of Civil Engineers).
May 21. Joint meeting to hear the report of Mr. Metcalf on the Chicago Public Service Committee.

CHICAGO: (With Western Society of Engineers).
April 21. The Triplex Process of Making Steel, by Robert J. Young, Manager Department of Safety and Relief, Illinois Steel Co., shown by moving pictures. Fatigue of Metals, by Prof. Herbert F. Moore, Department of Experimental Engineering, University of Illinois. Illustrated with motion pictures and lantern slides.

CINCINNATI:
May 15. Trade with South America, by Ernest F. DuBrul. Illustrated with stereopticon.

MILWAUKEE: (With Milwaukee Engineering Society).
May 21. A Trip to Japan, by Arnold Pfau, Consulting Engineer, Allis-Chalmers Co.

HARTFORD: (With American Chemical Society).
May 12. 3.00 P. M.—Inspection Trip, Hartford Rubber Works, under direction of Mr. Charles B. Whittlesey, president and factory manager.
5.00 P. M.—Inspection Trip, Laboratories of Henry Souther Engineering Co., under direction of Mr. James A. Newlands.
6.30 P. M.—Get-together dinner.
8.00 P. M.—Illustrated lecture on Rubber by Dr. Theodore Whittlesey, in charge of U. S. Rubber Co., General Laboratories.

MERIDEN:
May 20. The Hand Stoker, What It Is, and What It Does, by George H. Thacher, combustion engineer of The Files Engineering Co., Providence, R. I. Illustrated.

MID-CONTINENT (Tulsa, Okla.):
May 23. A full account of the first technical meeting of this Section appears on this page.

NEW YORK:
May 16. Informal luncheon to Council members.
May 28. The Five-Color System of Camouflage, by John M. Goodwin, of the Artillery Division of the War Department. The Layout and Equipment of Factories—working methods, industrial accounting, handling of men, etc., by Frederick Meron, a Belgian engineer. Illustrated by colored lantern slides.

ONTARIO (Toronto):
May 16. Discussion on the Metric System: Pro: Dr. E. F. Burton, of the University of Toronto, and W. Percy Dobson, laboratory engineer Hydroelectric Power Commission; Con: Chester B. Hamilton, manager, Hamilton Gear & Machine Co., and Ernest V. Pannell, engineer, British Aluminum Co.

PHILADELPHIA:
May 27. Discussion of the report of the special Committee on Aims and Organization.

PROVIDENCE ENGINEERING SOCIETY:
May 6. Central Station Growth by Nicholas Stahl, general engineer, Narragansett Electric Lighting Co.
May 13. The Potter and Johnston Automatic Lathe and its Tooling, by Mark Whitehead, chief draftsman of the Potter and Johnston Machine Co., Pawtucket, R. I.

ST. LOUIS:
May 23. The Human Element in Industry, by Dr. Edward J. Swift, Ph.D., Professor of Psychology and Education, Washington University.

WORCESTER:
May 28. Discussion on Fuel Conservation by J. F. Tinsley.

Mid-Continent Section

On May 23 the Mid-Continent Section, whose headquarters are at Tulsa, Okla., held an all-day meeting in the Chamber of Commerce Rooms of the Tulsa City Hall. The morning program opened at 8.30 with a discussion on and adoption of the Constitution and By-Laws for the Section. The business session also determined upon a second vice-chairman for the states of Kansas, Oklahoma, Arkansas, Louisiana and Texas, the number of yearly meetings and the aims, and the ways and means of sustaining the Section.

Following the luncheon there was an inspection of airplanes which had been brought from the Air Service Production Center No. 2 at Romorantin, France, by Lieut. E. E. Ives, recently of the U. S. Air Service. Following the inspection was an address on What Should be the Content of a Course of Instruction Designed to Fit a Man to Become a Petroleum Engineer: (*a*) From the Production Standpoint; (*b*) From the Refining Standpoint, by Dean J. H. Felgar, School of Engineering, University of Oklahoma, after which five-minute discussions were heard from the following: A. G. Heggem, Tulsa, Okla., Prof. E. J. Fermier, Texas Agricultural and Mining College; Paul Paine, Gypsy Oil Co., Tulsa, Akla.; Prof. Charles Jablow, Oklahoma Agricultural and Mining College, Stilwater, Okla.; Dr. C. K. Francis, Cosden and Co., Tulsa, Okla.; Dean P. F. Walker, School of Engineering, University of Kansas, Lawrence, Kan.; and E. F. Curtiss, Empire Refineries, Bartlesville, Okla. George Tayman, Jr. of the Gypsy Oil Co. delivered an interesting address on Volumetric and Mechanical Efficiency of Gas Compressors with Varying Combinations of Pressure and Vacuum. Prof. C. E. Pearce, Kansas State Agricultural College, Manhattan, Kan., delivered an address on Graphic Methods and Charts for Design of Steam Boilers and other High-Pressure Vessels.

The evening session, preceded by an informal dinner, opened at 8.00 p. m., and consisted of the following program: Appraisement and Valuation of Oil and Casing-head Properties, by O. J. Berand, Vice-President and General Manager of the Oklahoma Petroleum and Gas Co., Tulsa, Okla.; Industrial and Manufacturing Possibilities in the Mid-Continent Section, by Dean P. F. Walker, School of Engineering, University of Kansas, Lawrence, Kan.; Tank-Car Maintenance, by Paul Bateren, Manager, Peoples Tank Line Co., Coffeyville, Kan.; Effects of Compressed Air or Gas on Petroleum Oil Production by W. S. Smith, Miller Gas Engine Co., Tulsa, Okla.

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications and positions listed below combine the services of the Society and of the Engineering Societies Employment Bureau, Room 903, Engineering Societies Building.

POSITIONS AVAILABLE

Stamps should be inclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society records.

MECHANICAL ENGINEER as ASSISTANT TO CHIEF ENGINEER. Young man, graduate of recognized mechanical engineering school preferred. Must have at least several years' experience designing machinery for iron and steel works. Permanent position and good chance for advancement. State age, experience and salary expected. F-0109.

MECHANICAL ENGINEER with some experience and knowledge of safety razor-blade business. Location Massachusetts. F-0145.

ASSISTANT FACTORY MANAGER, in charge of planning department. Technical man, having at least five to ten years' practical experience as an executive in manufacturing lines, well versed in scientific shop management and modern methods of manufacture. Location Illinois. Salary $4000 to $6000 per year. F-0160.

GENERAL SUPERINTENDENT to take full charge of operating departments of the plant.

not necessary to be technical man, but must be man well versed in up-to-date manufacturing methods, with at least ten years' practical experience, in charge of responsible work in manufacturing lines. Salary $4000 to $6000 per year. Location Illinois. F-0161.

DRAFTSMAN with experience in tool designing wanted by large manufacturing company in Pittsburgh district. Steady employment, good working conditions. F-0162.

OIL ENGINE DRAFTSMAN to detail parts under general supervision. Thoroughly competent and experienced man. Salary approximately $40 per week or more depending upon experience. Some one located in vicinity of Philadelphia preferable. Name confidential. F-0164.

DRAFTSMAN experienced in design of industrial trucks and trailers. Technically trained man preferred. State in first letter experience, age, education, married or single, and salary expected. Location Massachusetts. F-0170.

INSTRUCTOR for technical school in Brooklyn; for electrical laboratory and class-room work. Duties will include responsibility for an elementary electrical course, and assistant in a more advanced course; engineering school graduate and a few years' practical experience. Previous teaching experience desirable but not absolutely necessary. Beginning salary $1500 to $1800 per year depending upon individual. Apply by letter stating age, religious affiliation, education and experience and enclose recent photograph if available. F-0172.

HEAD ENGINEER AND DESIGNER with technical and practical experience in designing high-grade machine-tools; qualified to design; to develop personnel of the drafting room; to systematize the arranging and filing of necessary engineering data; to cooperate with shop in devising improved means for getting out work. Give full details of age, education, and positions held, and salary expected. All information considered strictly confidential. Location Ohio. F-0174.

INSTRUCTOR for Department of Machine Design: (a) technical college graduate; (b) one preferably not a technical college graduate, but young man who has had shop and drafting-room experience. Location Stevens Institute of Technology. F-0175.

EXPORT MAN, competent export sales engineer, Latin-American machinery and metal trade. Prefer man with established trade. State age, experience, salary and reference. Headquarters; probably New York. F-0178.

CIVIL or MINING ENGINEER to act as Assistant Superintendent of mine in the Southwest. Must have Eastern experience and be thoroughly versed in mining engineering. Age 30 to 45. Give short synopsis of experience and education and if requirements are satisfactory applicant will be asked to make appointment to meet the head of the concern in question. Name confidential. F-0180.

SALESMAN, age 30 to 40, personally acquainted with large jobbers and manufacturers of bicycle accessories, to represent prominent accessory manufacturer; must be alive to the importance of cycle industry, capable of meeting men with large interests and be a good judge of human nature. State salary desired. F-0181.

SALES DEPARTMENT of leading textile-machinery manufacturing concern want young men, preferably graduate engineers, some knowledge of cotton mill processes and machinery; experience in mills, willingness to accept traveling position which allows return to headquarters usually every week end, with opportunity to develop from comparatively modest beginning to position where a man's ability to make good will be properly recognized. Field covers the Southern states, and a man from the North, who has located South and become acclimated, intending to make this territory his permanent location, would have preference. Character and personal habits must necessarily be unquestionable. F-0183.

HIGH-GRADE ENGINEERING DRAFTSMEN who are thorough in structural work, including heavy timber construction in all its various forms; also experience in plant mechanical engineering. Several men who are thoroughly experienced in mechanical and plant engineering, design and layout, not small-machine design. F-0184.

ESTIMATING AND COST KEEPING, young man with three to four years' experience, preferably one with some experience in drafting, to follow up construction work in office and field; to compile records of cost of labor and material, together with time records, and compute unit costs for use in further estimating. Location Niagara Falls, New York. F-0185.

COMPETENT DRAFTSMEN, several openings for good designers, preferably men acquainted with printing presses. State full particulars in first letter. Location Plainfield, New Jersey. F-0187.

CHIEF DRAFTSMAN for permanent position, New Jersey concern. Must be experienced in designing of printing machinery; good executive; able to direct and to take charge of moderate size drafting room. State age, salary and full particulars in first letter. F-0188.

DRAFTSMAN, A-1 in building of silk machinery. Location New York. F-0189.

DESIGNERS AND DRAFTSMEN, tractor, tool and jig. Salary from $25 to $50 per week, depending entirely upon ability of the men employed. Concern manufacturing farm tractors in large quantities, offers positions with excellent chances for advancement to men with ability. Location Iowa. F-0190.

DRAFTSMAN experienced in industrial-plant work, building layout and general equipment. One who has some experience and can work under direction. Position not expected to be permanent. Location Delaware. F-0191.

TECHNICAL GRADUATE with one or two years' practical experience; should be familiar with problems of factory transportation. New England concern. F-0194.

EXPERIENCED ICE AND REFRIGERATOR ENGINEER to take entire charge of erection of ice plant from beginning to end. Prefer man with three or four years' experience with one of the ice-machine manufacturers. Appointment through New York office. F-0195.

STUDENT APPRENTICESHIP COURSE in miscellaneous mechanical-engineering research work connected in a very general way with steam turbines for mechanical engineering graduates, for those either now or upon graduating from this year's class, who wish to specialize along the theoretical rather than the commercial side of mechanical engineering. F-0196.

DRAFTSMAN in maintenance department. First-class man with experience on steam power-house equipment and piping work. Location Philadelphia. In making application, state experience in full. F-0197.

ELECTRICAL-ENGINEERING DRAFTSMAN. Prefer man who has had at least seven to ten years' practical experience, in which work he was called upon to make his own measurements in the field for necessary alterations in wiring layouts, low-tension bus-bar equipment, etc. Also desire that he be a graduate of any good recognized school of electrical engineering. Must be able to exercise good judgment in making of small alterations to wiring layouts and location of electrical equipment in the field. Location Niagara Falls, N. Y. F-0198.

ESTIMATOR on sheet-metal and tank work. Must be familiar with estimating from blue prints and specifications. Salary $30 per week. Headquarters Jersey City. F-0199.

DIE-CASTING EXPERT for the representative of a large foreign interest, a young, ambitious mechanical engineer familiar with the die-casting industry; to design and carry through to the production stage the necessary dies; to take charge of drawing office, and supervision of die-production tool room. The services of this man, if satisfactory, would be utilized in England. Good opportunity; initial compensation would be very fair for the right man. F-0201.

ENGINEER with business experience and familiar with cost accounting and planning. Three to four months' position. Salary $3000 to $4000. Location Philadelphia. F-0202.

SALES ENGINEER, preferably with experience as chief marine engineer, or graduate engineer familiar with internal-combustion engines and with automobile trade. Good salesman, good appearance and ability to meet the best people. Salary $2700 to start. Headquarters probably Detroit, Mich. F-0203.

COMPETENT YOUNG ENGINEERS, preferably about the age of thirty, with some experience in time studies, rate setting, bonus figuring, production and experimental work. Must be college trained, with some experience; American, familiar with steel manufacture, preferably with the manufacture of small steel parts. Location Indianapolis, Ind. F-0206.

SALES ENGINEER with some chemical knowledge and who has acted as Assistant or Sales Manager; 30 to 35 years. Location New York. F-0207.

SALES ENGINEER. Good opportunity for experienced man; New England concern. F-0208.

SKILLED, PRACTICAL MECHANIC on all classes of machine shop, tool-room and maintenance of machinery and tools, with a knowledge of high-speed steel tools and cutters, making and scientific hardening; also some experience in general shop methods and leadership. Man who is progressive, agreeable and who possesses an extraordinary amount of initiative and tact. Salary $200 to $250 to start. Preferably unmarried. Must be willing to change location frequently. F-0209.

SALES REPRESENTATIVES, well established company, with headquarters in New York, desires engineering sales representatives in New England, Middle Atlantic and Western States; must be thoroughly capable in steam engineering and steam heating specialty lines. F-0210.

SUPERINTENDENT OF FACTORY. Output includes punching machinery, turret lathes, and special appliances of highest grade. Reorganization of factory system contemplated and applicant must be especially experienced as an executive in handling men and securing efficient production. Must be thoroughly acquainted with best shop practice for economic production, including design and manufacture of jigs and fixtures, rate setting, routing and figuring of costs. Applicant for permanent connection only desired. Age desired under 45. Location New England. In writing, state fully record of experience, salary desired and when available. F-0212.

ASSISTANT IN MECHANICAL ENGINEERING. An engineering educational institution in the East desires a young graduate in mechanical engineering as assistant; will cover class-room work, laboratory and drawing in some of the branches of mechanical engineering under the supervision of a professor. Instructors in this department are so rotated that experience in all branches of mechanical engineering is gained. F-0219.

MACHINE DESIGNER experienced on machinery for making fiber paper containers. State age, experience, references, and salary expected. Location Maryland. F-0220.

SALESMAN. Technical education and sales experience; must be familiar with boiler room practice. No salary; straight commission. Location New York State. R-601.

MECHANICAL ENGINEER; technical knowledge and at least 4 years' office experience along lines of conveying apparatus, piping and steam work. Salary $150 to $175 per month. Location New Jersey. R-605.

MACHINE-SHOP AND ERECTING FOREMAN; must be able to read drawings, make mechanical sketches and must have had not less than 10 years' experience in large railroad shops, one year of which should have been in responsible charge. Location Philippine Islands. R-610.

MASTER MECHANIC OF BY-PRODUCT COKE DEPT.; mechanical engineer, about 35 years

of age, with engineering experience, handling shop work and general maintenance of plant equipment. Should be capable of handling skilled labor, possess executive ability, initiative and aggressive efficiency. Salary $225 per month. Location Colorado. R-612.

ASSISTANT MECHANICAL ENGINEER: experienced in steam power, heating and ventilating work, for estimating layout work and general office supervision. Salary depends largely on man, $1500 to $2000 per year. Location New York City. R-614.

MECHANICAL ENGINEER: young man, technical education, knowledge of Spanish, single, and not afraid to rough it during the first few months; discharged soldier or sailor preferred. Location Mexico. R-618.

MECHANIC: young man, good mechanical experience, knowledge of Spanish, single, and not afraid to rough it during the first few months; discharged soldier or sailor preferred. Location Mexico. R-619.

SALESMAN: technical education and not more than two or three years' experience as salesman. Must have good personality. Will be trained to sell electric-welding apparatus. Traveling position. Salary depends upon man. R-625.

DRAFTSMAN experienced along the electric-welding line and possessing some mechanical ability. Work will consist of assisting in design and development of electric-welding machines; both of resistance and of arc-welding type. Location Ohio. Salary $150 per month. R-627.

FOREMAN: competent foreman about 30 years of age to systematize and bring up-to-date shop methods in a plant manufacturing steam specialties. Salary depends upon experience. Location New York City. R-630.

CIVIL ENGINEER: technical education and training in general engineering and building construction. Man about 30 years of age desired, preferably unmarried. The various engineering constructions in which firm is engaged are as follows: Investigations, inspections, reports and valuations, design and supervising of construction for industrial plants and buildings, power plants, difficult foundations, bridges and steel structures, wharf and dock construction, river and harbor works, investigating and development of mining properties, general building construction ranging from bungalows to apartment houses. Salary depends upon man. Location China. R-632.

MECHANICAL ENGINEER: graduate mechanical engineer with speaking knowledge of Swedish for position with export house. Salary depends upon experience. Location Sweden. R-633.

PUBLIC UTILITIES ENGINEER: technical education and experience in gas and electric public-utility work. Location New York State. R-634.

ELECTRICAL DRAFTSMAN, technical school graduate, with at least three years' drafting-room experience, capable of handling electric-design work on steam or hydroelectric stations, and high or low-tension substations. Must be an American citizen under 45 years of age, in good health and physically sound. Salary of $200 per month. Bachelor quarters supplied. Location Panama Canal. R-636.

MASTER MECHANIC: high-class mechanic, under 45 years of age, with experience in refrigeration and preferably one who has also had packing house experience, to supervise entire mechanical department of a packing house plant, including machine shops, car-repair shops, power plant, motor-truck equipment, electrical departments, etc. The plant operates the Arctic, De La Vergne, Vilter and Ball ice machines; Curtis turbine generator, etc. Salary depends upon ability of the man. Location Iowa. R-641.

PLANNING ENGINEER: experienced in this line of work; must have had charge of a successful planning department or a similar position in manufacturing plant. Salary depends upon ability of man. Location Connecticut. R-642.

INSTRUMENT MAKER with experience in handling men and also full experience as tool maker; knowledge of electrical instruments valuable; must have good machine-shop experience. Position will be on the bench, but man will have responsible charge of primary manufacturing of weather instruments, heat regulating and adjustment instruments, etc. Salary depends upon man. Location New York State. R-643.

DRAFTSMAN: young man with good training and education; must be able to do accurate, reliable work and should have had some shop experience on the design of jigs and fixtures. Location Vermont. R-646.

GAS ENGINEER experienced on estimating, appraising and operating gas plants. Location New York. R-649.

ELECTRICAL ENGINEER: experienced in design and construction of light and power plants, chiefly office work. Salary $125 per month. Location Ohio. R-656.

PRODUCTION ENGINEER: first-class production engineer to manage factory manufacturing vacuum cleaners, etc. Concern is well established and is going, but desires a man to invest a nominal sum in the company as a guarantee of good faith. Location Ohio. R-658.

HEAD OF MECHANICAL ENGINEERING DEPARTMENT: must have had experience as mechanical engineer and be capable of filling the position of head professor of mechanical engineering in a college which is about to enlarge its engineering courses. Salary depends upon ability of man. Location New Jersey. R-661.

CHIEF ENGINEER AND DESIGNER: experienced on the design of high-grade adding machines and typewriters. Salary depends upon man's experience. Location New Jersey. R-664.

ELECTRICAL ENGINEER: graduate electrical engineer with sufficient experience in bituminous coal mining to take charge of mine electrical installation work, including high and low voltage, a. c. and d. c. equipment, short-wall mining machines, d. c. haulage locomotives, etc. Knowledge of underground mining desirable. Salary $175 per month. Location Illinois. R-665.

MECHANICAL ENGINEER FOR PROMOTION WORK: experience along that or similar lines. Duties will consist of calling on possible customers in varied lines of industry with a view to finding out whether they could use company's product and how they could use it. Must be able to render a report to the sales promotion manager which definitely states whether or not the company would be warranted in going after a particular sort of business. Salary depends upon ability of man. Location Ohio. R-667.

MECHANICAL ENGINEER: young man who is willing to cast his lot with a concern manufacturing photo papers and who can run its power and refrigeration plant. Must have some skill in machine design, so as to be able to improve mechanical processes of coating and drying; some knowledge of heating and ventilating desirable. Man must have character and ability, also initiative, and must be willing to work. Location New York State. R-670.

MECHANICAL ENGINEER: GRADUATE, experienced in conveyor work and shop-development work. Must understand and be able to develop belt processes. Must also have good personality and be unmarried. Salary depends upon the ability of man. Traveling in New England. R-671.

ELECTRICAL DRAFTSMAN: seven to ten years' practical experience in work demanding that man make his own measurements in field for necessary alterations in wiring layouts, low-tension bus-bar equipment, etc. Must be a graduate of any recognized school of electrical engineering and should be of such a type that he would be able to exercise good judgment in the making of small alterations to wiring, layouts and location of electrical equipment in the field. Location New York State. R-472.

SUPERVISOR with general all-round executive experience. Must be capable of taking charge of the manufacturing departments of large merchandising house. Duties are in the nature of production engineering. Salary $50 to $60 per week. Location New York. R-673.

SUPERINTENDENT OF REPAIR DEPARTMENT: executive experience such as would fit man to take charge of departments of a large merchandising house for the repair of jewelry, clocks, china and optical instruments, etc. Salary $40 per week. Location New York City. R-674.

TOOL-ROOM SUPERINTENDENT: extensive experience in such capacity. Location Connecticut. R-676.

CHIEF INSPECTOR: extensive experience in handling a large force of piece-part inspectors. Location Connecticut. R-677.

STRUCTURAL DESIGNER: extensive experience as designer and draftsman, along mechanical and structural lines, preferably on mill and smelter work. Location New Mexico. R-680.

CABINET DESIGNER familiar with the design, construction and manufacturing methods of phonograph cabinets. Location Connecticut. R-681.

ELECTRICAL ENGINEER: must be experienced in locating and constructing electric traction lines. Location Colombia, Central America. R-683.

MECHANICAL ENGINEER: several years' experience in mechanical engineering work. Must have considerable ingenuity in research and design work. Location New Jersey. R-687.

SAFETY INSPECTOR: graduate mechanical engineer with sufficient amount of machine-designing experience to enable him to design safeguards or special appliances for various machines throughout manufacturing plant where such devices may be the means of more protection to the employees, and thereby cause a consequent increase in production. Salary about $1800 per year. Location Ohio. R-688.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 12th of the month, and the form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

METALLURGIST with complete experience in die-casting industry wishes to make change; can take entire charge of die-casting plant, or start new plant from ground up. Has several patents on die-casting processes of non-ferrous alloys and new dies. F-408.

SUMMER WORK in mechanical or electrical engineering desired by assistant professor with four years practical engineering. Especially experienced in power-plant practice and automobile design. Available June 15. Age 29. F-409.

ENGINEERING EXECUTIVE. Executive assistant to manager or president of industrial works or public utility, or with consulting mechanical engineer. Technical graduate (M.E.), age 31, with broad experience in teaching, shop development, operation and commercial research. In the service since May 1917. Lieutenant and later as Captain of Engineers. As assistant in charge of important shop development in the A. E. F. F-410.

METALLURGIST AND CHEMIST. Thorough theoretical and practical knowledge of heat treatment, metallography, physical testing, pyrometry and metallurgical chemical analysis; four and one half years engaged in above work, nineteen months First Lieutenant, Ordnance Department, U. S. Army, assigned to Inspection Division; only permanent connection with broad future will be considered. F-411.

TECHNICAL GRADUATE, degree M.E., age 27, married. Five years' experience in refrigeration-plant operation. University laboratory and shop instruction; steel foundry sales; consulting work on power-plant equipment; and as superintendent of heavy-artillery shell-forging plant. Can furnish references. Will accept position in any desirable locality, preferably Middle West. Available about June 20. F-412.

MECHANICAL ENGINEER AND EXECUTIVE having 15 years' experience with well-known architects and engineers in designing, erecting and studying maintenance of various industrial plants, hotels, power plants and miscellaneous large building projects desires new position. Thoroughly familiar with purchase of mechanical equipment. Salary now $5000; wants opportunity to earn more. Married, age 36. Excellent references. Graduate mechanical engineer. Possess tact and good business ability. F-413.

WORKS MANAGER OR GENERAL SUPERINTENDENT. American, now serving as staff engineer with Ordnance Department Claims Board desires position with manufacturing company. Previous experience: twelve years as works manager of company manufacturing superheaters, ten years as erecting and operating engineer of pumping machinery. A thorough understanding of gray-iron foundry, forge and machine-shop practice. Has originated and developed machines and tools and proved a good organizer and executive. F-414.

MECHANICAL ENGINEER, 18 years' experience in modern methods of interchangeable production, estimating, planning, routing, time study, machine and tool design, installation and maintenance of equipment, as shop foreman, master mechanic, chief draftsman, chief engineer. Now in U. S. Ordnance Dept. Desires to make connection with progressive concern in an executive capacity in engineering, production or efficiency department. Available July 15, will go anywhere in United States or abroad. F-415.

ENGINEER EXECUTIVE. Graduate mechanical engineer University of Kentucky, age 25, desires responsible executive connection with manufacturing or steel industry upon release from active duty. Prior to enlisting in Naval Reserve, three years' experience in engineering and steel plant operation. Now is officer in charge of Naval Ordnance Inspection district in Middle West making settlements, etc. Can furnish highest references if necessary. F-416.

ENERGETIC YOUNG ENGINEER. Technical graduate, degree of M.E., desires opportunity with live manufacturing concern as assistant to the production engineer. Familiar with both wood and metal-working tools. Past 16 months in responsible charge of war work, supervision of manufacture, writing reports, working plans, and analysis of manufacturing data. Unquestioned energy and ability. American, age 24. F-417.

ENGINEER, executive or designing, technical graduate, conscientious, thorough and energetic, with 20 years' experience, including design, construction, operation and maintenance of industrial plants; layouts, estimates, appraisals, equipment, tests, efficiencies and economies. Thoroughly competent on general mechanical-engineering problems from drafting room, shop or field standpoint. Available February 1. $4000. F-418.

FACTORY EXECUTIVE, MANAGER, SUPERINTENDENT. Age 39, married, technical education, 15 years' practical experience in executive capacities in large factories, industrial, chemical, mechanical; energetic, resourceful, efficient organizer. Reasonable salary. F-419.

EXECUTIVE, MECHANICAL AND ELECTRICAL ENGINEER, technical graduate, age 43, recently released from Production Division, Bureau of Steam Engineering, U.S.N. Twenty years' experience in all branches of public utility, engineering management and finance. Ten years' experience in financial reports involving investments and appraisals of gas, electric, street-railway, water and refrigeration properties. Specialist in economic power production and handling of men. Excellent record negotiating large contracts involving sales engineering. Desires connection where demonstrated ability will lead to an interest in a business. Eastern location preferred. F-420.

PROFESSOR OF MECHANICAL ENGINEERING, 12 years' experience teaching steam and gas-engineering subjects. Now head of the department and considered good executive. Experience operating in commercial plants, testing and erection work, anxious for position where there is an opportunity to develop equipment, shops or laboratories. Would make good in power-plant development. F-421.

GRADUATE MECHANICAL ENGINEER desires either engineering or industrial position with good future. Middle West or West location preferred. Graduate of Purdue University 1918. Age 24 years, single. Employed at present. F-422.

MECHANICAL ELECTRICAL ENGINEER, 15 years' experience in efficient power production, both steam and hydro, and transmission with public utilities. Several years on installation of electrical equipment in large industrial plants. At present executive engineer of industrial plant in charge of power generation and distribution, maintenance and repair of all mechanical and electrical equipment and repair shop. Excellent references as to character, organizing and business ability. Age 35, married. Middle West location preferred. F-423.

ASSISTANT TO GENERAL MANAGER, OR PLANNING ENGINEER. At present employed as head of cost and production departments of well-known machinery company. Seven years' experience covering a wide range of manufacturing in various executive positions; lowest salary to start $5000 per year. F-424.

TECHNICAL GRADUATE in mechanical engineering. Worcester Polytechnic Institute. Three years' experience in shop and drawing room, desires position with chance for advancement in the East. Ensign in Naval Reserves recently placed on inactive duty, 27 years of age and married. Minimum salary, $2000. F-425.

MECHANICAL ENGINEER, M. I. T. 1917. Two years drafting and engineering experience including some accounting, desires to connect with manufacturing or industrial concern F-426.

PRODUCTION AND DEVELOPMENT ENGINEER. One year service as production officer Ordnance U. S. A. Two years' experience as assistant production and development engineer in factory employing 4000 men making optical machinery and optical goods. One year as assistant director of shops of a noted technical University. Two years' experience in heat treatment of steel and investigation work in large steel and wire company. Technical graduate, 30 years old, member of A.S.M.E. and open for immediate engagement. Location preferably East. F-427.

YOUNG BUSINESS AND TECHNICAL GRADUATE; one year shop, one year advertising, two years' executive experience. Minimum salary $3000 and will earn it. F-428.

MECHANICAL ENGINEER at present employed desires position in executive capacity with medium-size growing manufacturing concern where originality and initiative are required and appreciated. College graduate, three years' practical experience in foundry and machine shop, three years time setting and systematizing in large machine shop, one and one-half years executive position in large ordnance plant, supervising purchasing of complete new equipment organization, installation of production and cost systems including manufacturing methods. Age 27 years. Married, minimum salary $3000. F-429.

INDUSTRIAL ENGINEER desires permanent connection as manager or chief engineer with pulp or paper plant; 15 years' experience covering design, construction, maintenance, purchasing and operating of mills manufacturing sulphite, sulphate and mechanical pulp, newsprint, wrapping and book papers. At present employed as chief engineer. Married. Salary $9000 per year. F-430.

MECHANICAL ENGINEER, technical graduate, age 27 years; 4½ years' experience including mechanical research, machine design, production and efficiency engineering, sales-promotion work and branch sales office experience. At present employed as research and efficiency engineer with small manufacturing concern but wish to make a change. Willing to go out of the country if required. Salary $2100. F-431.

ENGINEERING EXECUTIVE. For the last six years with large industrial corporation handling problems in industrial organization and office management. Specialist in engineering department organization. Thorough training in shop practice, machine, foundry design, organization and sales work. Will go anywhere but prefer New England. Young man, good health, married. Can handle and hold men to best advantage. Best of references. F-432.

MECHANICAL AND ELECTRICAL ENGINEER, 35; experienced in administrative and executive duties; and on plant design and construction; nine years' active experience field and office covering power and pumping plants, locks, dams, and hydraulic machinery, steam and gas-engine installations, and hydraulic-suction dredge operation and maintenance; inspection of materials and preparation of specifications and proposals. Graduate engineer, Capt. of Engineers U. S. A., 2 years service, about to be discharged and desires to make suitable permanent commercial engineering or contracting connection; preferably Pacific Coast or Intermountain States; can invest limited capital in soundly established business or office of contracting or consulting engineer, minimum acceptable salary $2500 per annum. F-433.

EXECUTIVE OR SALES ENGINEER, who can leave Navy very soon, desires connection as executive sales manager, or similar responsible position where executive ability, combined with engineering and business experience is essential. Graduate R. P. I. Electrical with mechanical experience five years, experience electrical one year; Lieutenant Navy Reserve in charge of aircraft supplies, excellent references if desired. F-434.

ASSISTANT SUPERINTENDENT OR SALES ENGINEER. Young mechanical engineer, at present officer in the Ordnance Department, U. S. Army, about to be discharged upon termination of present duties desires position. Graduate M. I. T. 1915. Principal experience has been in production and organization work in manufacture of machine tools and munitions. Some sales experience. F-435.

GRADUATE MECHANICAL ENGINEER, 1914, age 29, American, married; at present employed as assistant to maintenance engineer in locomotive manufacturing plant employing 3200 men. Desires similar position, or as works or maintenance engineer, with industrial corporation or railroad. Experienced in plant maintenance, design and installation of mechanical equipment, estimates, superintending erection of shops, shop layouts, heating and sprinkling systems. Familiar with the manufacture of locomotives having spent one year in shops as apprentice. With present company three years and eight months, only reason for seeking change is for greater opportunities for advancement. Only permanent high-grade proposition considered. F-436.

ENGINEERING ATTORNEY FOR PATENT DEPARTMENT, graduate engineering and law, member bar U. S. S. C., formerly examiner Patent Office, 16 years in practice for self, specialty metal-working and machine-tools, knowledge of French and German, desires position with concern having or about to establish a patent department; salary $5000; location immaterial. F-437.

PRODUCTION ENGINEER OR PLANT EXECUTIVE. Associate member, graduate mechani-

cal engineer, wants responsible position with progressive manufacturing plant. Now Army Officer in charge of production, inspection, and settlement of claims against the Government on cancelled contracts. Nine years of manufacturing experience on production of interchangeable parts in large quantities. F-438.

MECHANICAL ENGINEER. Stamford Graduate, 17 years' experience, 10½ years in designing hydraulic, mining and miscellaneous machinery, one year in designing hydroelectric development, four years in designing mechanical equipment of state institutions, one and one-half years in manufacture of seacoast and railway gun carriages; last six and one-half years as engineering department executive. At present employed by U. S. Ordnance Department; available after June 30; locality preferred, California; age 40; minimum salary $3000. F-439.

GRADUATE MECHANICAL ENGINEER, 35, married. Captain Ordnance Dept. soon to be discharged. Good executive and organizer who has had ten years' experience in design and construction of large power plants, control-heating and industrial plants. Responsible charge of design and construction of some large installations. Also six years' experience in practical machine-shop work. In charge of M. E. unit, construction section, Ordnance Department designing building and operating freight and ordnance developments. Desires responsible position with engineering, industrial or public service organization. Minimum salary $300 a month. F-440.

MECHANICAL ENGINEER, with 20 years' practical experience in manufacture of interchangeable parts. For the last ten years successful in handling large organizations on mass production. Only interested in good broad company and one looking for man of that type. At present employed. 42 years old. F-441.

EXECUTIVE OR SALES ENGINEER. First Lieutenant, Ordnance U. S. Army, about to be discharged from the service desires executive or sales engineering position. Age 29, single, graduate ME., Cornell University, experienced in the manufacture, production and heat treatment of interchangeable parts and tool-room practice with large corporation. For the past 21 months engaged as 1st Lieutenant of Ordnance in the manufacture of small arms, and at present connected with the staff of the Ordnance Claims Board. Vicinity of New York City preferred though not essential. F-442.

TEXTILE ENGINEER with 20 years' successful experience in design, construction and operation of textile plants desires position preferably along operating lines with substantial Eastern manufacturing company. Practical experience combined with technical training; well posted in modern employment methods. Now employed. Initial salary not less than $5000. Married. F-443.

SALES ENGINEER desires to represent in the Birmingham, Ala., district, some large concern manufacturer, power-plant equipment, steam specialties, valves, fittings, power-plant piping, etc. Now employed as steam-specialty engineer for large company. Technical graduate in mechanical engineering; 12 years' experience in mechanical and power-plant engineering (both sales and construction). Familiar with the different types of steam specialties. Age 33. Married. Would consider salary and commission or strictly commission proposition. F-444.

MECHANICAL-CHEMICAL-SALES ENGINEER. Graduate mechanical engineer, 8 years' experience in chemical plant layout and apparatus design and operation for by-product coke oven concern; three years in power plant, heating and ventilating; six years in business and sales. Desires connection with company manufacturing engineering specialties, temperature-controlling devices, etc., or chemical by-products in technical and sales position or as district office manager. Position must offer opportunities for advancement. Would not object to some design work in connection with sales proposition. Excellent references. Age 32, married. Location New York City or vicinity. F-445.

MANAGER, SUPERINTENDENT OR ENGINEER. Technical graduate, 39 years of age. Experience in manufacture of interchangeable parts, factory maintenance and equipment. Well versed as planning engineer in rate setting, cost and modern shop management. Successful handler of help; 10 years engineering, and maintenance 12 years. Toolwork and manufacturing. New York or New Jersey preferred. Available at once. F-446.

ASSISTANT EXECUTIVE, age 27, married, technical graduate 1915. Three years' experience in office management, stores, payroll and purchasing methods. New England or Metropolitan District preferred. Junior A.S.M.E. F-447.

MECHANICAL ENGINEER, MANAGER, GENERAL SUPERINTENDENT OR CHIEF ENGINEER. Heavy machinery, pumps and hydraulic machinery. Location Middle West. Age 41. Twenty-one years' experience. $6000 per annum. F-448.

FACTORY MANAGER, broad engineering and manufacturing experience. Thoroughly experienced in manufacture of articles requiring accurate production at low cost; about to leave the Army desires position in charge of factory preferably in New England or New York. F-449.

MECHANICAL ENGINEER, 20 years' experience in mechanical and electrical work, desires engagement on long or short jobs as consulting engineer, power-plant designing and construction engineer. Master mechanic, superintendent or production manager or building construction engineer. F-450.

ASSISTANT MANAGER OR EXECUTIVE ENGINEER. Graduate electrical and mechanical engineer, age 30; experienced in power-plant and sub-station construction, operation and maintenance; organization; appraisal engineering; steel-mill operation and machine-shop practice; executive ability and can handle men. Recently relieved from active service as Lieutenant U. S. N., as an engineer officer in battleship fleet. Desires to make permanent connection with concern where there is opportunity for advancement. Salary $3600 to $4000. New York or Eastern location preferred. F-451.

GRADUATE MECHANICAL ENGINEER with 3 years' experience in research, efficiency and organization engineering with highly organized button concern. Discharged army officer. Position desired with an industrial establishment as assistant to works manager or with industrial engineer. F-452.

MECHANICAL ENGINEER, technical graduate, age 32, married; six years' experience in construction, operation and testing of large central stations, desires position with strong company where results count. F-453.

WORKS OR PRODUCTION MANAGER, graduate Stevens Tech., thoroughly versed in scientific management, planning, scheduling, and organization methods. Wide experience in manufacturing lines, including war munitions and materials. Would like executive position with well-organized concern. Available within one month. F-454.

TECHNICAL GRADUATE. Mechanical engineer, age 26. Naval officer recently released from active duty; four years' experience in steam engineering and the anti-friction bearing industry. Desires position either in engineering or engineering sales. F-455.

COMBUSTION OR PLANT ENGINEER of large manufacturing concern. Experience as machine-shop superintendent, electric power and light central-station manager, superintendent heating and power-piping concern. Age 45. Married. Technical education. At present combustion engineer in charge of several plants aggregating 40,000 boiler hp. Thoroughly familiar with modern power-plant and boiler-room practice. Present salary, $3000. F-456.

MECHANICAL ENGINEER, Captain Inspection Division, Ordnance Department U. S. A. discharged. Four years' experience in all branches of shop work, ten years' experience in design construction and maintenance of industrial and chemical plants. Familiar with theory of shop organization and management F-457.

MECHANICAL ENGINEER, desires position as chief engineer or assistant chief engineer where executive experience in handling men and situation is required. Thorough technical training and broad fundamental engineering experience. F-458.

SUPERINTENDENT OF POWER. Chief engineer of power plant or master mechanic of factory. Technical graduate, 30 years old, with nine years' experience in steam-electric power-plant operation and maintenance with some construction experience. Thoroughly practical around boilers, engines and power-plant machinery in general. Stationary engineers' license for New York City. At present chief engineer of large building with power plant. New York City or vicinity preferred. Salary $3000. F-459.

MECHANICAL ENGINEER, going to Europe at end of year and being familiar with European methods of salesmanship and business wishes to represent American concern. Has wide relations and entrée in leading concern in England, France, Italy, Belgium and Spain. Can start new branches abroad, or investigate conditions for American firms whose representatives are costly but not productive. Can give best references on results already achieved and has organization of native engineer salesmen ready to go into immediate action. F-460.

PROFESSOR OR ASSISTANT PROFESSORSHIP in mechanical or experimental engineering is desired by Captain of Engineers about to be released after two years' service. Six years teaching and four years practical work. Teaching experience in an Eastern technical school. Practice included shop development and operation and commercial research in heat and power problems. Age 31. Degrees of Ph.B. and M.E. Member of Sigma Xi. Salary $2500 to $3500 depending on location. F-461.

PRODUCTION ENGINEER, age 27. Columbia 1915 M.E.; four years' practical experience in drafting, inspecting and production work, including systematizing routing and scheduling, seeks position in production, sales or other department, where such experience combined with executive ability can be used to advantage. Location near New York City preferred. F-462.

MECHANICAL ENGINEER AND EXECUTIVE just released from service, 36 years old, wide experience. F-463.

FACTORY, ENGINEERING OR SALES EXECUTIVE in airplane or seaplane construction, inspection, operation or repair. Lieutenant Navy Reserve seaplane pilot with very broad and privileged experience extending from raw materials to repair and salvage of all type seaplanes and flying boats. Graduate electrical engineer with six years' experience mostly mechanical. Consider services will be of exceptional value to aeroplane manufacturers or promoters, nationally or internationally. Excellent references. F-464.

ELECTRICAL AND MECHANICAL ENGINEER. Captain U. S. A. at present in France; 18 months' service. Good command of English, French and German. Graduate Durham College, England. Salary $4000. F-465.

INSTRUCTOR MECHANICAL ENGINEERING, with large mid-west university. At present assistant professor of machine design, in charge of department. Seven years' teaching experience, eight years' office and shop experience. Present salary $2400. F-466.

ASSISTANT MANAGER OR ASSISTANT SUPERINTENDENT of industrial plant. Age 43, married, technical graduate; six months concrete-structural work in charge for owner; six years assistant engineer in charge of office, inspecting tunnels and houses, studying layout for completed tunnel line and grade; eight years engineer, chief draftsman as production engineer in charge of all contracts to comple-

tion, manufacturing pier shed doors, ferry-bridge machinery, electric-car-barn equipment, etc. Salary to start $3000 per year; location preferred Middle West or South. F-467.

SALES ENGINEER. Age 33; married; Harvard A.B. 1909, Cornell M.E. 1911; eight years' experience in development work in connection with internal-combustion and steam engines; electrical ignition apparatus and boiler plants; executive experience as officer of two engineering corporations; organized boiler-plant conservation work for New York State Fuel Administration; sales experience as distributor for light motor trucks, sale of patent licenses and familiar with patent procedure; working knowledge of French, German, and Spanish, having travelled extensively in Europe and United States; initiative and personality exceptional. Desire work with established and successful small concern in which technical training may serve in a commercial way. Middle West or Eastern States preferred. F-468.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER JUNE 19

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 174.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by June 19, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

Arkansas

REID, JOSEPH G., Consulting Engineer, Little Rock

California

GOLDMAN, OSCAR G., Assistant Engineer, Spring Valley Water Company, San Francisco

TIMBS, EDWARD, Chief Draftsman, Union Tool Company, Torrance

TRIPP, BURTON H., District Manager of Sales, Chicago Pneumatic Tool Company, San Francisco

Connecticut

GREIG, ALEXANDER, Assistant Superintendent, Hartford

KEATING, ARTHUR E., Assistant to Chief Engineer and Fuel Engineer, American Tube & Stamping Company, Bridgeport

RICHTER, PAUL C., Superintendent of Chain Hoist, The Yale & Towne Manufacturing Company, Stamford

STARR, CHARLES J., Estimator, The New Britain Machine Company, New Britain

VINE, MALCOLM, Chief Inspector, Remington Arms Company, Bridgeport

VINTEN, ERNEST S., Member of Shop Committee, Sargent & Company, New Haven

VOGEL, FRED J., Electrical Draftsman, Civil Service Federal Government, Bridgeport

District of Columbia

BARRETT, WILLIAM J., Technical Staff, Ordnance Department, Fire Control Instrument Branch, Washington

BRADT, MORRIS, 1st Lieutenant, Ordnance Department, U. S. A., Trench Warfare Division, Washington

CALLAGHAN, EDWARD M., Mechanical Draftsman, Engineering Bureau of Ordnance, U. S. Army, Washington

ROSE, JOHN B., Colonel, Ordnance Department, U. S. Army, War Department, Washington

SCHWARTZ, ANDREW J., Supervising Draftsman, Navy Yard, Washington

SVEJDA, JAROSLAV A., Leading Ordnance & Mechanical Draftsman, Naval Gun Factory, Washington

Florida

SWEARINGEN, THOMAS J., Bureau of Industrial Economy, Jacksonville

Illinois

BOEHME, PAUL L., Assistant Production Engineer, Ordnance Department, Production Division, Holt Manufacturing Company, Peoria

FARRIS, JAMES A., Mechanical & Sales Engineer, Scully-Jones & Company, Chicago

HALL, HARRY S., 1st Lieutenant, Ordnance Department, U. S. A., Chairman Advisory Committee on Miscellaneous Contracts, Chicago District Ordnance Claims Board, Chicago

PAULEY, JAMES B., Vice-President, J. K Dering Coal Company (Reëlection) Chicago

SIBERT, HAROLD W., Mechanical Engineer, Frost Manufacturing Company, Galesburg

STEFFENSEN, SIGURD H., Construction Engineer, Illinois Steel Company, Chicago

Indiana

ATWOOD, FRANCIS L., Vice-President & General Director of Manufacturing, Midwest Engine Company, Indianapolis

BOETEL, FREDERICK W., Engineer, Indiana Public Service Commission, Indianapolis

HOLLERITH, CHARLES, Assistant in Research & Experimental Laboratory, Nordyke & Marmon Company, Indianapolis

STEVENS, GEORGE D., Chief Engineer, Fort Wayne Corrugated Paper Company, Fort Wayne

Louisiana

CONNELLY, ROBERT R., Mechanical Engineer on Appraisal Staff, American Sugar Refining Company, New Orleans

Maryland

RUEFFEL, CHARLES L., Marine Engine Draftsman, Baltimore Drydock & Shipbuilding Company, Baltimore

Massachusetts

ARRINGDALE, LEROY O., Assistant Engineer, Sturtevant Mill Company, Boston

BASS, IVAN E., Commander U. S. Navy, Engineer Officer, Navy Yard, Boston

BIGELOW, GEORGE H., Assistant Chief Engineer, Liberty Mutual Insurance Company, Boston

BOARDMAN, WALLACE E., Mechanical Designer, Stone & Webster, Boston

CHISHOLM, HAROLD V., Estimator, Walworth Manufacturing Company, Boston

CONNOR, ALEXANDER P., Electrical & Mechanical Engineer & Lawyer, Holyoke

DISBROW, WILLIAM S., Chief Designer, Norton Grinding Company, Worcester

JONES, EMERY W., Draftsman, Boston Woven Hose & Rubber Company, Cambridge

McCANN, WILLIAM J., Safety Engineer, Ludlow Manufacturing Associates, Springfield

MARRAN, VINCENT P., General Superintendent, Walsh's Holyoke Steam Boiler Works, Holyoke

MUNSON, FRED G., Manager, W. M. Steele Company, Worcester

SHEA, DANIEL J., Mechanical Draftsman, Aberthaw Construction Company, Boston

STANTON, EARL F., Assistant Plant Engineer, Bethlehem Shipbuilding Corporation, Fore River Plant, Quincy

TAFT, PAUL F., 1st Lieutenant, Ordnance Department, U. S. A., Springfield Armory, Springfield

Michigan

BARNS, ROY L., Assistant Master Mechanic, Solvay Process Company, Detroit

BELKNAP, JOEL R, Superintendent of Power, Dow Chemical Company, Midland

HENDERSON, J. V., Chief Engineer, Hotel Statler, Detroit

LEGG, KARL W., Tool Designer, Packard Motor Car Company, Detroit

LISCOM, ARTHUR C., Superintendent of Production Gas Department, Ford Motor Company, Detroit

STAHL, RODOLPHE, Consulting Engineer, Automobile Bellanger Frères, Detroit

Minnesota

GRANT, ALLEN A., Senior Inspector, The Travelers Insurance Indemnity Company, Minneapolis

Missouri

FITZPATRICK, CHARLES V., Head Draftsman, Weber-Engine Company, Kansas City

GASS, AUGUST, Chief Engineer, Merchants Ice & Coal Company, St. Louis

SHARTLE, RALPH W., Master Mechanic, Wagner Electric Manufacturing Company, St. Louis

New Jersey

BARNES, SAMUEL R., Assistant Superintendent, Calco Chemical Company, Jersey City

BURKE, ROBERT E., Consulting Engineer, Hoboken

CAMP, WILLIAM, Assistant Shop Superintendent, Pond Works, Niles-Bement-Pond Company, Plainfield

COLE, CHARLES B., Chief Tool Inspector, Wright-Martin Aircraft Corporation, New Brunswick

EATON, WILLIAM W., Apprenticeship Course, Babcock & Wilcox Company, Bayonne

FOX, FRANK W., Assistant Boiler-Room Foreman, Eagle Oil Works, Standard Oil Company, Jersey City

FREYSCHMIDT, CURT, Inspector of Engines, U. S. Shipping Board, Emergency Fleet Corporation, Bound Brook

GUSTAFSON, JOHN G., Mechanical Engineer, Elevator Supplies Company, Hoboken

HAEGERT, LEE V., Ensign, Engineering Duty, U. S. N. R. F., Hoboken

HUNTER, FRANCIS W., Clerk, De Laval Steam Turbine Company, Trenton

LIMBRUNNER, JOSEF, General Manager, New Jersey Machine Corporation, Hoboken

NETSCHERT, WILLIAM, JR., Apprentice Engineer, Babcock & Wilcox Company, Bayonne

WELCH, ROBERT J. M., Plant Engineer, Bethlehem Shipbuilding Corporation, Ltd., Elizabeth

New York

ANDERSON, C. EINAR, Engineer, E. W. Bliss Company, Brooklyn

BASSET, WILLIAM R., President, M'ller, Franklin, Basset & Company, New York

BERGEN, GEORGE W., Ensign, U. S. N. R. F., New York

BLUNT, JAMES G., Mechanical Engineer, American Locomotive Company, Schenectady

BOGIE, ROBERT R., Engineer of Manufacturing and construction, Kings County Lighting Company, Brooklyn

BRASHER, PHILIP, Director of Personnel, Guggenheim Brothers, New York

BROOTZKOOS, SERGIUS, Consulting Engineer, E. W. Bliss Company, Brooklyn

CHRISTIANSEN, ALF W., Estimator, U. S. Government, Watervliet Arsenal, Watervliet

COLBURN, BETHUEL V., Industrial Engineer, Dahlstrom Metallic Door Company, Jamestown

COLLINS, WALLACE H., Ensign, U. S. Navy, U. S. S. Nevada, New York

CROUSE, GEORGE B., Department Engineer, Sperry Gyroscope Company, Brooklyn

CROWE, WALTER A., JR., Salesman, Chicago Pneumatic Tool Company, New York

DANNEHOWER, GILBERT L., Vice-President & General Manager, C. E. Johansson, Incorporated, New York

DAVIS, ROY W., Master Mechanic, Nathan Manufacturing Company, Flushing, L. I.

DEANS, JOHN S., JR., General Superintendent, J. N. Byers & Son, Incorporated, Buffalo
FOSTER, WALTER E., Manager, Atlantic Coast Division, The Pfaulder Company, Rochester
FRANZ, FREDERICK, Mechanical Engineer, Willard C. Brinton, New York
FRASER, ROBERT M., Assistant Superintendent, Rome Wire Company, Rome
GARVIN, ROYER B., A Director of the Garvin Machine Company, New York
GODOY, EMILIO S., Vice-President & General Manager, Standard Shipbuilding Corporation, Shooters Island
GREENE, CHARLES T., General Manager, Arnold-Hellmuth Manufacturing Company, Inc., Brooklyn
HART, HARRY G., Manufacturer, Vice-President, Hart & Crouse Company, Utica
HIRSCHFELD, EMIL, General Manager, Post van der Burg Company, Inc., New York
KEYS, DOUGLAS L., Assistant Superintendent, New York District, The Texas Company, New York
KLAESS, JOSEPH W., Ensign, U. S. N. R. F., Rockville Center, L. I.
KOPP, CHARLES, Consulting Engineer, American Burtonizing Company, Elm Park
McEWEN, WM. ROBERT, President, McEwen Brothers, Wellsville
MEADE, HAROLD W., New England Manager, Swedish Gage Company, Incorporated, New York
MIDDLETOWN, MORTIMER, Mechanical Engineer, New Jersey Zinc Company, New York
POLIAKOFF, ROUVINE, U. S. Representative of All-Russian Zemsky Union, Managing Trustee, Russian Remington Rifle Contract Trustees, New York
RAUSCH, CHESTER C., Safety Engineer, Assistant Director, Safety Institute of America, New York
ROBERTS, WALTER H., Ensign, U. S. Navy, U. S. S. Polar Land, New York
SCOTT, G. NORMAN, Chief Engineer, Standard Shipbuilding Corporation, Shooters Island
SIMMONS, EDWARD A., President, Simmons-Boardman Publishing Company, Brooklyn
SIMPSON, FREDERICK C., Mechanical Engineer, Amirall & Company, Incorporated, New York
SMITH, HARRIS F., Engineer, Edwin H. Ludeman, New York
SMITH, SAMUEL A., Construction Engineer, By-Products Coke Plant, Buffalo
STEINDL, EMANUEL, Machine Designer, American Standard Motion Picture Machine, Bronx
STEPHENSON, HERMANN, Industrial Engineer, Kodak Park Works, Eastman Kodak Company, Rochester
WARD, JOSEPH W., Plant Engineer, Taylor Instrument Co.'s., Rochester
WARNER, SAMUEL T., Fuel Engineer, The Texas Company, New York

Ohio

BOWERS, CHARLES H., Tool Designer, The National Supply Company, Toledo
BULLEIT, ORA L., Assistant to Chief Inspector, Platt Iron Works, Dayton
FREEMAN, HOVEY T., Industrial Investigations, Cleveland
GOODRICH, CHARLES W. McK., Mechanical Draftsman & Designer, U. S. Engineers Corporation, Cincinnati
HYATT, GEORGE, Superintendent, Asphalt Block Cement Company, Toledo
JENKINS, THERON W., Manager, Railway & Factory Sales, The American Rolling Mill Company, Middletown
SCHWIMMER, FREDERICK J., Machine Designer, National Supply Company, Toledo
STREINE, FRANK H., General Manager, The Streine Tool & Manufacturing Company, New Bremen
WORDEN, FRANK B., Assistant to Manager, United States Shipping Board, Emergency Fleet Corporation, Cleveland

Oklahoma

DYKEMA, WILLIAM P., Superintendent, U. S. Bureau of Mines, Petroleum Experiment Station, Bartlesville
HOFFMAN, JOHN A., Industrial Engineer, Cosden Refinery, Tulsa
JOHNSON, CHARLES M., Designing Engineer, W. G. Williams, Consulting Engineer, Oklahoma City

Pennsylvania

BOSLER, LESTER C., Steam Engineer, Midvale Steel & Ordnance Company, Nicetown Plant, Nicetown, Philadelphia
CAUGHEY, ANDREW F., Field Work, Engineering Department, American Railways Company, Philadelphia
DURHAM, J. EDWARD, JR., Vice-President & Secretary, Bonney Vise & Tool Works, Allentown
DURHAM, FRED S., Vice-President & Treasurer, Bonney Vise & Tool Works, Allentown
FINN, EDWARD D., Vice-President & Production Engineer, Malm Engineering Company, Philadelphia
HASTEDT, HERBERT J., Assistant to District Sales Engineer, B. F. Sturtevant Company, Pittsburgh
HOPPING, ERNEST L., Engineer of Station Mechanical Design & Construction, The Philadelphia Electric Company, Philadelphia
LEINROTH, EUGENE A., Sales Engineer, Chicago Pneumatic Tool Company, Philadelphia
LOWE, HAROLD M., Student Apprentice, Westinghouse Electric & Manufacturing Company, Wilkinsburg
McCUISTON, EDWARD R., Assistant Planning Engineer, Bethlehem Steel Company, Bethlehem
MORAN, AUGUST H., In charge of Machine & Tool Design, Small Arms Department, Frankford Arsenal, Philadelphia
PARENT, W. EARL, Chief Draftsman, Miller Lock Company, Frankford, Philadelphia
REA, HENRY R., Pittsburgh
SILDAT, JOHN G., Engineer, Union Ice Company, Pittsburgh
STEARNS, WALTER D., Efficiency Engineer, Westinghouse Electric & Manufacturing Company, E. Pittsburgh
THORN, THOMAS H., Sales Engineer, Homestead Valve Manufacturing Company, Homestead
TUCKERMAN, GEORGE E., Process Engineer, Ballenger & Perrot, Philadelphia
VOLKHARDT, WALTER, Progress Engineer, Emergency Fleet Corporation, Philadelphia
WILSON, CHRISTIAN, JR., Assistant Production Engineer, Department DM, Bethlehem Steel Company, Bethlehem

Rhode Island

INGALLS, CHAUNCEY H., Mechanical Superintendent, The United States Finishing Company, Providence

Texas

AIKEN, FRANK J., Superintendent, Texas Machine Works, Port Arthur
BRYANT, JOHN M., Professor of Electrical Engineering, University of Texas, Austin
FLACH, WALTER J., General Installation Foreman, Lone Star Shipbuilding Company, Beaumont
KAPELLMANN, WILLIAM, Chief Draftsman, Garner-Bartlett Machine Works, Houston

Utah

MITCHELL, BENJAMIN A., Mechanical Engineer, Utah Copper Company, Arthur

Virginia

SPOFFORD, WOLCOTT E., Draftsman, Virginia Shipbuilding Corporation, Alexandria

Washington

DEAN, ERNEST P., Inspector, Electrification Department, C. M. & St. P. Ry., Seattle
HILLS, CHARLES H., Seattle Sales Manager, Worthington Pump & Machinery Corporation, Seattle
MORDEN, CHARLES W., Assistant Mill Manager, Crown Willamette Paper Company, Camas

Wisconsin

FANNON, RALPH W., Chemical Engineer, Wausau Sulphate Fibre Company, Mosinee
PEARSON, CARL E., Works Manager, Webster Electric Company, Racine

Canada

MORGAN, ALFRED H., Chief Engineer & Mechanical Superintendent, E. Leonard & Sons, Limited, London, Ontario

France

TOMPKINS, R. HARRY, 1st Lieutenant, 111th Engineers, U. S. A.

Japan

RABBITT, JAMES A., Representative of U. S. War Trade Board for Japan, Tokyo

Straits Settlement

HADLEY, FRANK L., General Superintendent, Endau Development Company, Limited, Port Penyabong

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE

Ohio

MEIER, CHARLES, Sales Manager & Engineer, The Cincinnati Planer Company, Cincinnati

PROMOTION FROM ASSOCIATE-MEMBER

District of Columbia

SAURWEIN, GEORGE K., Captain, Mechanical Engineering Unit, Field Service, Ordnance Department, U. S. A., Washington

Massachusetts

DE FLOREZ, LEWIS, Consulting Engineer, Messrs. Cochrane, Harper & Company, Boston

Ohio

MALM, ANEL C. V., President & General Manager, Malm Machine Company, Dayton
WIGHT, HARRY C., General Superintendent, Division of Water, Dayton

Pennsylvania

GENTLES, FRANK, Marine Engineer, U. S. Shipping Board, Emergency Fleet Corporation, Philadelphia

PROMOTION FROM JUNIOR

District of Columbia

GAILLARD, DAVID ST. P., Captain Ordnance Department, U. S. Army, Ordnance Office, Washington

ROGERS, JOHN D., Captain, U. S. Army Engineering Corps, Office of Chief of Engineers, Washington

Illinois

SAUSEN, BERT R., Research Engineer, The Star Brass Works, Chicago

Maryland

POSEY, JAMES, Consulting Engineer, Baltimore

Massachusetts

CATTERMOLE, LESTER G., Chief Western Engineer, Cooley & Marvin Company, Boston

New Jersey

COATES, E. OSBORNE, Remington & Vosbury, Consulting Engineers, Camden

New York

AGNER, OWEN B., Vice-President & General Manager, Street, Agner & Moore, New York
CONARD, FRED U., Underwood Computing Machine Company, New York
RICHARDSON, AMMI C., Mechanical Engineer, American Thread Company, New York

Ohio

ESTEP, HARVEY C., Editorial Director, The Penton Publishing Company, Cleveland

Pennsylvania

FENHAGEN, FRANK D., Designing Engineer, Barrett Company, Chemical Department, Frankford, Philadelphia

Canada

HASTIE, CHRISTOPHER, Surveyor to Lloyd's Register of Shipping, Vancouver, B. C.

Germany

MORGAN, JOHN T., Major, In charge of Construction of Buildings & Power Plants for Embarkation Point in Germany, Army of Occupation, Coblenz

SUMMARY

New Applications	137
Change of Grading	
Promotion from Associate	1
Promotion from Associate-Member	5
Promotion from Junior	13
Total	174

In Two Sections—Section Two

Volume 41 Number 7

MECHANICAL ENGINEERING

THE JOURNAL OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

July, 1919

Society Affairs

A Record of the Current Activities of the Society, Its Members, Council, Committees, Sections and Student Branches; and Affairs of Interest to the Membership

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
29 West 39th Street, New York

SOCIETY AFFAIRS

Affairs of Interest to the Membership — Secretary's Letter — Council Notes — A Lesson from England — Classification of Membership — Meetings of Local Sections — Employment Bulletin — Candidates for Membership

The Secretary's Letter

THE Committee of the four National Engineering Societies and the American Chemical Society, and possibly some others, have been engaged for considerable time in an introspection of their aims and activities.

The membership generally have been contributing ideas. The committees of the several organizations have been carefully selected so as to secure the widest representation, at least geographically, and from a glance at the composition of these committees it would appear that the different vocations are also well represented.

The result of such study should be, if the effect of the World War has been what extreme sacrifice should make it, that the Societies' main work must be an unselfish devotion to the public good.

A comparison of the results of the work of these committees would, perhaps, be of assistance to all. In our own Society I delight to see the prominence given to the encouragement in research. If there is to be a continuation of our national prosperity in competition with the rest of the world, it is essential that we develop research contemporaneously with all our wonderful growth. It is incumbent on this nation, which has been spared devastation, to assist all nations in the art of management and in quantity production. That is the big American virtue and it should be stated in this connection that we have developed it without the loss of soul and the higher standards of life.

Standardization also has a prominent place as an inherent feature of our industrial development and mass production, and if it is essential to this work that the Society take a more prominent stand "by way of actually adopting standards" in distinction from ordering reports "printed," by all means let us do so; but unless it is essential, which I doubt, undue emphasis should not be placed on this particular phase of standardization work. Standardization and research call for numerous devoted committees and the emphasis should be placed on the inspiration of specially fitted members to offer themselves for this important work.

The Society cannot finance more than the expenses of the necessary staff to record and promulgate the work performed by the Committee members themselves. This work must be borne by the individual members or by the individual companies with whom the members are engaged.

In my experience with the largest industrial companies of the United States I have found them uniformly anxious and willing that the companies' funds should be expended for these purposes, as it all contributes to the general prosperity of our country, and where the country is generally prosperous the separate companies will naturally also be prosperous.

Many urge that industrial management be brought again to the front as a prominent feature of the Society's activities. This is as it should be, and here it should be remembered that for a number of years our Society was regarded as the pioneer in the development of the art and that the work of our Past-President F. W. Taylor brought great distinction to the Society. This art is the one great American contribution to the world, and in France and Belgium, particularly, it is being studied more than in any other country connected with industry. Here again the development of this activity of the Society's work will require a devoted committee.

For some unexplainable reason, which is not peculiar to the engineering societies, the American public does not devote the attention to education that the people of other countries do. Engineering societies in Great Britain and in Germany have had the greatest of influence on the curricula in these countries, yet in our country it is almost unthinkable, at the present time, for an engineering college to confer with a professional society, as such, on the subject of the education of engineers. It is greatly to be hoped that the leading engineers can be aroused to their opportunities to contribute to the progress of their profession in this respect.

In relation to the community I have been urging throughout the United States that the engineer is peculiarly responsible and competent to pass upon at least the technical features of public works and that it is his duty as an engineer-citizen to perform those functions which will contribute to the general good of the community in which he lives.

As to the internal organization, I heartily commend the broadening of the Engineering Council and Engineering Standards Committee to include all national and local organizations.

The Committee of the American Society of Civil Engineers has most admirably prepared the way for a study by its statement of the problem and this coming week will probably bring out their recommendations.

The Committee of the American Institute of Mining and Metallurgical Engineers has confined its recommendations, as far as I have been able to learn, to the method of representation on the Board of Directors, so as to secure a greater degree of participation by sections, and a committee similar to ours has recommended the participation of their members in "ordinary economic and legislative affairs." It also recommends the extension of the Engineering Council and its "representative character."

The Committee of the American Institute of Electrical Engineers recommends that their Proceedings be developed to include other material essential to an engineering magazine than that simply confined to the papers before the Institute. They recommend visits by the Institute officers to the sections, and as between the sections of the Institute and the sections of other societies they recommend a still closer coöperation.

The Committee of the American Institute of Electrical Engineers in common with the Mining Engineers and ourselves recommends "more activity in public affairs" as well as participation in broadening the engineering curricula of the colleges. It further recommends in connection with our committee and that of the Mining Engineers a revision of the "Board of Management" of the Council that will make it more representative, and has also become convinced that the Engineering Council should include delegates from as many other engineering societies as are worthy and willing to participate.

The Committee of the American Chemical Society recommends a greater participation in Government activities in connection with the different departments of the Government, as it sees a great future for the chemical industry. Some of the ways in which this could be effected would be through publications, the extension of the library service, the gathering of statistics and through the unification of scientific resources, even to the extent of a new department of applied science with a secretary who would be a scientist or an engineer of note.

Many of the suggestions of the Committee of the American Chemical Society with respect to chemistry are applicable equally to other industries of which this Society is probably representative, and it is to be hoped that sooner or later there will be a coming forward of members to offer to do for their respective industries under the auspices of this Society what a chemist naturally offers to do under the auspices of his society for the chemical industry.

The ambition of this Society to play a real part and to contribute directly from its funds toward research however modest those funds may be, should encourage all members to regard themselves as authorized missionaries. Never was the necessity so great

as in the immediate present when the one greatest world need is a return to normal industry. Therefore it is to be hoped that many members who read this letter will be inclined to write and offer their personal services in the present industrial situation for the general good of the country.

CALVIN W. RICE,
Secretary.

Council Notes

THE Council convened on two occasions in connection with the Spring Meeting at Detroit. The first meeting was held at 10 o'clock on Monday morning, June 16, at the headquarters of the convention, the Hotel Statler, and this was adjourned at 1.30 p.m. and reconvened at 3.30 p.m. on Wednesday, June 18. The Council welcomed the presence of the large number of past presidents.

The two meetings were both significant for their large attendance and for the amount of business. Past-President Oberlin Smith, who was a guest of the Council on both occasions, remarked, "I have never seen so many members of the Council at meetings before," and President Cooley also remarked concerning the order of business, "This certainly looks very much like work."

There were present at the first meeting: *President* M. E. Cooley, in the chair, *Vice-Presidents* Max Toltz, Fred R. Low, and John A. Stevens; *Managers* W. B. Gregory, D. R. Yarnall, C. L. Newcomb, C. R. Richards; *Past Presidents* James Hartness, D. S. Jacobus, Ira N. Hollis, and Charles T. Main; W. E. Symons, *Chairman Finance Committee;* D. S. Kimball, *Chairman Meetings and Program Committee;* G. A. Orrok, *Chairman of the Publications and Papers Committee;* and also by invitation, *Past-Presidents* Oberlin Smith, Jesse M. Smith, S. T. Wellman, Worcester R. Warner, and Major Fred Miller, present on the recommendation of the Chairman of the Publication Committee, and Calvin W. Rice, *Secretary;* and at the second meeting all the above with the exception of Messrs Hollis and Orrok and Kimball and Major Fred Miller, and with the addition of A. M. Greene, Jr., *Chairman Research Committee;* Guido H. Marx, of Palo Alto, Cal., representing the Committee on Relations with Colleges; A. G. Christie, J. V. Martenis, Robert Sibley, H. J. O. Hinchey and T. H. Hinchman, constituting the Regular Nominating Committee; also C. H. Benjamin and H. G. Reist.

NOTES ON THE FIRST MEETING

The first business taken up was the report of the Special Committee on Aims and Organization, L. C. Marbury, *Chairman,* which was received and ordered transmitted to the Committee of the Society as a whole at the Semi-Annual Business Meeting on the afternoon of the same day.

Progress reports of the Standing Committees on Finance, Meetings and Program, Publication and Papers, Membership, Constitution and By-Laws, Research, and Local Sections were then received.

Professor Kimball, for the Meetings Committee, recommended St. Louis, Mo., for the place of the Spring Meeting next year and this was accepted.

Mr. Orrok, for the Publication Committee, reported at length on plans for the development of MECHANICAL ENGINEERING.

The President announced the appointment of John L. Harrington, of Kansas City, Mo., on the Committee on Constitution and By-Laws, to fill the vacancy caused by the resignation of Jesse M. Smith.

Mr. Yarnall, for the Local Sections Committee, presented a petition from the members in the State of Colorado for a Local Section there, which was granted.

Several standing and special committees then made reports, the first being the Sub-Committees of the Research Committee on Lubrication and on Bearing Metals. These two reports were received and were later transmitted to the business meeting of the society.

The President announced the appointment of L. P. Breckenridge to the Library Committee, to replace Jesse M. Smith, resigned, and the selection by this committee of A. M. Hunt as Chairman of that committee.

A report from the Standardization Committee on the development of the American Engineering Standards Committee, in which this society is represented, led to a discussion of the desirability of closer coöperation of all the societies in standardization and in other matters, with the following resolution introduced by Past-President Hollis:

Resolved: That the President of our Society be requested to confer with the Presidents of the four Founder Societies, and if he finds it advisable, with the Presidents of other National Engineering Societies, on the importance of bringing together Development Committees for a discussion of a proposed standardization association, and further the broadening out of our relation with other societies in order that the engineering profession may obtain a more representative organization than Engineering Council for dealing with all matters of common interest to the engineering profession, and that he request an early conference and report for use in the fall.

Dr. Hollis, for the Committee on Relations with Colleges acting as a special Committee on Awards, presented a valuable report and recommendations which will be published in full later. He announced that Past-President Main had personally contributed one thousand dollars to the "Charles T. Main Award" Fund, making this fund twenty-five hundred dollars. The Council expressed its thanks to Mr. Main for his splendid contribution.

Other orders of business were the expression of thanks and the discharge of the Society's representatives on the Conference Committee on Cost of Electric Power. The resignation of F. A. Geier, Manager, from the Council was received with regret to take effect in December, 1919. The President announced his own resignation as one of our representatives on the National Industrial Conference Board, which was also received with regret and the President empowered to fill the vacancy.

NOTES ON THE SECOND MEETING

The first business taken up was the continuation of the reports of special committees. Mr. Low, *Chairman, Power Test Committee,* reported a general meeting on June 2 in New York City, and requested the confirmation of a new individual Committee on Apparatus and Instruments, which was granted.

Interpretations Nos. 236 to 239 of the Boiler Code Committee were received and ordered printed in MECHANICAL ENGINEERING.

Professor Greene reported for the Research Committee.

On the recommendation of the Committee on Aims and Organization and by vote of the Society as a whole at the Business Meeting on June 16, that a special Committee on Code and Ethics be established, the President announced the appointment of the members of the Regular Nominating Committee to act as this committee, with the addition of Past-President Charles T. Main as temporary chairman.

C. C. Thomas, A. G. Christie and C. B. LePage were announced as Honorary Vice-Presidents, to represent the Society at the summer meeting of the Society for the Promotion of Engineering Education, at Baltimore, Md., beginning on June 27.

The President announced that the National Screw Thread Commission was to hold a meeting abroad shortly, but unfortunately one of our representatives, Past-President James Hartness, could not attend and requested an alternate, Luther D. Burlingame, who was appointed.

Professor Marx presented a valuable report of the Committee on Relations with Colleges which will be published later in MECHANICAL ENGINEERING.

A discussion on publicity for the general meetings led to a resolution to create a special Committee on Publicity for this purpose.

Matters on joint activities, including United Engineering Society and Engineering Council, were referred to our representatives on these bodies, to report back.

CALVIN W. RICE,
Secretary.

A Lesson from England

IN the Employment Bulletin in a recent issue of MECHANICAL ENGINEERING there appeared an advertisement for a production engineer of high qualifications and with American experience, for a factory in the north of England. We in America can hardly realize the significance of such a step unless we have followed the fundamental changes which have been produced in British industrial methods by the war. Before this the British viewpoint of American industrial methods and products was undoubtedly not at all favorable, but all this is changed now, and there is no question whatever but in the great international race for trade supremacy the British solidarity of product, combining with the American methods of cheapening manufacture by quantity production, will produce a formidable competitor.

In this connection we may well take a lesson from the effects of the war on British engineering standards, which are directed by the world-renowned British Engineering Standards Association. An article on this subject in a recent issue of the *Engineering Review* (London) brings out forcibly the status of our ally in the field of standardization as follows:

BRITISH ENGINEERS LEAD THE WAY

"Although much remains to be accomplished it is encouraging to reflect that British engineering industries will start to win the peace with standardization developed far in advance of our commercial rivals. Rapid strides have certainly been made in America in recent years, thanks in no small measure to British guidance and help, but save in one or two instances the United States standards are far less comprehensive and inferior in coördination compared with present-day British standards.

"Probably the first important move in British standardization was initiated by Sir Joseph Whitworth nearly 80 years ago, when he advocated the adoption of the Whitworth screw threads. Sir Joseph, writing in his own work on standardizing thread gages, said:

"'We find instead of that uniformity which is so desirable a diversity so great as almost to discourage any hope of its removal. The only mode in which this could be attempted with any probability of success would be by a sort of compromise, all parties consenting to adopt a medium for the sake of common advantage. The average pitch and depth of the various threads used by the leading engineers would thus become the common standard, which would not only have the advantage of conciliating general concurrence, but would in all probability be nearer the true standard for practical purposes than any other.'

"The difficulties in establishing standards proved not so great as they originally appeared, and standard threads came to be adopted not only in Great Britain, but in all other countries. These standards remain, though extensions and modifications have since been made to meet the requirements of the times.

"Systematic standardization in the engineering trades of this country practically began in 1901 when through the initiative of the late Sir John Wolfe Barry, K.C.B., F.R.S., the British Engineering Standards Committee came into existence. During the past year the Committee has been incorporated as an Association with a definite constitution, but since its inception certain fundamental principles have governed its work, amongst which may be placed in the forefront the community of interest of producer and consumer.

MEETING RECOGNIZED REQUIREMENTS

"The policy of the Association might well be phrased 'No standardization without representation.' For it undertakes standardization, not on academic lines, but to meet recognized requirements, and then only at the request of some responsible body and those representing the interests concerned. It aims at insuring standards, drawn up by the industry for the industry, leaving it to the user to satisfy himself by inspection and supervision that the standards are adhered to. Moreover periodical revisions of the standards are carried out in order that improvements may be undertaken, the various industries thus being prevented from becoming stereotyped and their methods hidebound. To accelerate the issue of British Standard Specifications, modifications of a far-reaching character in the procedure of the Association have been introduced. In the old days when trade organization had not reached its present stage of efficiency much difficulty was experienced in obtaining a consensus of opinion from an industry on standardization, and consequently the work of the Standards Committee did not receive widespread adoption. Conditions have changed fortunately for the better in that respect. When dealing with any problem of standardization the Committee first calls a conference of all interested parties in order to ascertain whether there is a general desire for the work to be undertaken. If the decision is favorable to it, the work goes forward and a fully representative committee is appointed. Those committees dealing with brass, for example, concentrate at Birmingham, and the steel committees meet in Sheffield; in fact, every effort is made to discuss the details on the spot with managing directors, works managers and engineers, and, if necessary, even in the workshops with the men particularly acquainted with the use of small tools and so on, and on whom the success of new standards so much depends.

SCOPE OF THE ASSOCIATION'S WORK

"Some idea of the scope of the British engineering standardization may be gathered from the fact that close on 250 committees, sub-committees, and panel committees, most of which are standing committees, and over a thousand members are now gratuitously devoting their time and experience to this work, often at great personal expense and inconvenience. The specifications and reports embrace practically the whole field of engineering and allied industries and are constantly being augmented. Among other important matters dealt with, or receiving immediate attention, are standardization of steel sections, railway and tramway rails and accessories, tramway poles, automobile parts and materials, screw threads and their tolerances, Indian locomotives, railway rolling stock material, shipping material, material for bridges and general building construction, portland cement, road materials, rating rules of electrical machinery and apparatus, electrical accessories, machine tools (such as milling cutters, taps and dies), aircraft materials, alloys, timber, cotton ropes, steel ropes, cotton, casein, cements, varnishes and enamels, electrical appliances and chemical dope specifications. General testing conditions and procedure, too, claim consideration, as also do details in the construction of shops and their machinery.

"The B. E. S. A. at the special invitation of the authorities took over the drafting of all specifications for aircraft materials and parts, some 70 specifications having been sent to the Department of Aircraft Production for issue to the manufacturers. How satisfactorily the work has been performed is strikingly attested by the fact that recently at the request of the Air Ministry, the Association has been entrusted with the custody and distribution of the whole of the aircraft specifications, numbering some 200, which will become British standards.

COLONIAL AND FOREIGN PROPAGANDA

"Then again, a complete section with some 20 committees, has been established to deal with the standardization of the details in the construction of ships, this decision being the outcome of a conference called at the instance of the Board of Trade and representative of the Government, Classification Societies, Ship Owners and Marine Builders.

"The Standards Association has rendered much useful help to Canada and the United States in the coördination of standardization in the engineering industries; and the development of Anglo-American coöperation in connection with screw threads, machine tools, aircraft materials and electrical matters is likely to become of increasing importance.

"Nor has the work of propaganda in foreign countries been overlooked. The Association has translated its most important specifications into Spanish, Portugese, Italian and French, and already many thousands of copies have been circulated abroad. In the principal trading centers of the world Local Standards Committees of British engineers and traders are being established for the purpose of stimulating British trade, and these committees will be in direct communication with and act in an advisory capacity to the main committee in London. These committees are under the presidency, in the case of foreign countries, of the British Consul, and in the Overseas Dominions, of a Government official, the chairman in each case being an influential British engineer. The funds contributed by the Treasury and the industry for this desirable object make no provision for recurring expenditure and consequently the work of propaganda can only go forward very slowly.

GOVERNMENT ACTION PROBABLE

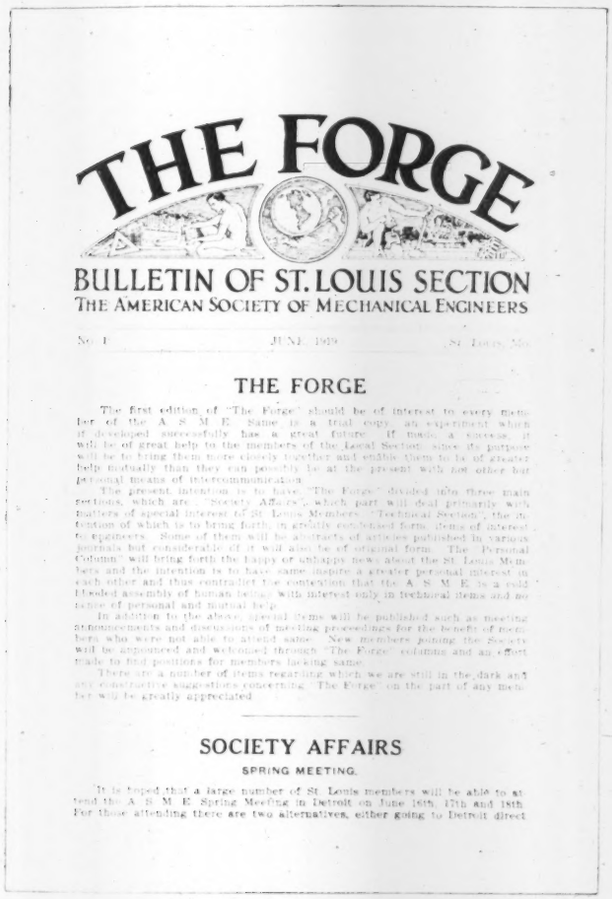
"It is quite within the range of probability that the Board of Trade will in the near future endeavor to set up a Department of Standards, but any attempt by this Department to interfere with the activities or the independence of the Standards Association is certain to arouse a storm of indignation. The Standards Association is conducted on business lines by business men, and as such enjoys the full confidence of the engineering industries and allied trades. Nationalization holds out not a vestige of hope for genüine development; on the contrary, it is likely to tend to waste and extravagance. Board of Trade action, on the other hand, would be welcome in the direction of financial support and encouragement in propaganda work.

"The Government, if it fully realized the value and importance of British standards, could render useful service by bringing the standard specifications prominently to the notice of all Departments, local authorities and specifying engineers up and down the country and by its insistence on British Standards, where such exist, being incorporated in all tenders and contracts.

"None the less it is incumbent on all branches of the engineering industries and allied trades to give the Association increasing support and no finer monument could be erected to the memory of the late Sir John Wolfe Barry to whose guiding hand through many years of his chairmanship so much of the success of the movement is due, than that the B. E. S. A. should be in a position to undertake any standardization work, however big, that it is invited by industry to accomplish."

The First Section Bulletin

Below is reproduced in miniature the attractive title page of what is believed to be the first printed bulletin to be issued by a Local Section of The Society. This initial number consists of



THE FORGE

BULLETIN OF ST. LOUIS SECTION
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

No. 1 JUNE, 1919 St. Louis, Mo.

THE FORGE

The first edition of "The Forge" should be of interest to every member of the A. S. M. E. Same is a trial copy, an experiment which if developed successfully has a great future. If made a success, it will be of great help to the members of the Local Section, since its purpose will be to bring them more closely together and enable them to be of greater help mutually than they can possibly be at the present with not other but personal means of intercommunication.

The present intention is to have "The Forge" divided into three main sections, which are: "Society Affairs", which part will deal primarily with matters of special interest to St. Louis Members. "Technical Section", the intention of which is to bring forth, in greatly condensed form, items of interest to engineers. Some of them will be abstracts of articles published in various journals but considerable of it will also be of original form. The "Personal Column" will bring forth the happy or unhappy news about the St. Louis Members and the intention is to have same inspire a greater personal interest in each other and thus contradict the contention that the A. S. M. E. is a cold blooded assembly of human beings with interest only in technical items and no sense of personal and mutual help.

In addition to the above, special items will be published such as meeting announcements and discussions of meeting proceedings for the benefit of members who were not able to attend same. New members joining the Society will be announced and welcomed through "The Forge" columns and an effort made to find positions for members lacking same.

There are a number of items regarding which we are still in the dark and any constructive suggestions concerning "The Forge" on the part of any member will be greatly appreciated.

SOCIETY AFFAIRS

SPRING MEETING.

It is hoped that a large number of St. Louis members will be able to attend the A. S. M. E. Spring Meeting in Detroit on June 16th, 17th and 18th. For those attending there are two alternatives, either going to Detroit direct

four 6 x 9-in. pages, but the prospectus presented on the first page, and which is commended to the consideration of members of the other Sections, will undoubtedly necessitate an increase in size in the near future. Which Section will be the next to follow the example set by the St. Louis membership?

Sections Meetings

BRIDGEPORT: (With local members of A. S. C. E., A. I. E. E., S. A. E. and A. C. S.)
June 26. Paper on Mechanical Apparatus in the Treatment of the Wounded by H. W. G. Thompson; paper by Mr. Boeghold on Investigation of Case Carburizing and Case Hardening.

CHICAGO:
May 29. Ladies' Night. Paper on Stress and Strain, by Dr. William S. Sadler.

CLEVELAND: (With Cleveland Engineering Society).
June 10. 10.00 a.m.—Open-hearth Charging Machine, by S. T. Wellman and I. D. Thomas.
11.30 a.m.—Dinner aboard steamship *City of Buffalo* and trip to American Ship Building Plant, Lorain.
1.00 p.m.—Talk by J. C. Workman, General Manager, American Ship Building Co.
6.30 p.m.—Dinner, Hotel Hollenden.

HARTFORD:
June 5. Sound, by Hiram Percy Maxim, President, Maxim Silencer Company.

MERIDEN:
June 6. Informal meeting and dinner.

NEW HAVEN:
May 27. Labor Problems, by Harry Gordon Hayes, Ph.D., Assistant Professor of Political Economy, Yale University.

NEW YORK:
June 10. General discussion of the report of the Committee on Aims and Organization.

PROVIDENCE ENGINEERING SOCIETY:
June 7. Inspection trip to the concrete steamship being outfitted by the Lord Construction Company.
June 17. Annual Meeting.

ST. LOUIS:
June 4. Certain New Developments in Rear-Axle Construction, by Wallace C. Capen, St. Louis Manager, The White Company. Illustrated with lantern slides.

WASHINGTON:
June 6. General discussion of the relation of the mechanical engineer to his work, to the community and to other engineers.

Student Branch Meetings

BUCKNELL UNIVERSITY:
June 2. Officers for next semester elected: T. C. Williams, chairman; J. M. Bauman, vice-chairman; H. L. Nancarrow, secretary; and Wm. Rolf, treasurer. [C. W. W.]

CALIFORNIA, UNIVERSITY OF:
May 7. The Governing of Early and Modern Water Wheels, by C. V. Foulds.
May 14. Election of new officers: Professor Raber, honorary chairman; O. D. Baldwin, chairman; L. C. Bush, vice-chairman; E. C. Percell, secretary; and Wm. Eischen, treasurer. [G. C. G.]

CARNEGIE INSTITUTE OF TECHNOLOGY:
May 14. Talk on Editing of Engineering Journals, by Mr. Staehle, editor *The Blast Furnace and Steel Plant.* [D. C. S.]

CORNELL UNIVERSITY:
May 7. Election of new officers: W. E. Richmond, chairman; Prof. W. M., honorary chairman; L. E. Kittredge, secretary. [L. E. K.]

KANSAS STATE AGRICULTURAL COLLEGE:
May 23. Account of artillery action in Battle of the Argonne, with special emphasis on the engineers' activities, given by H. A. Dawson. Talk on subject of Factory Illumination, by Professor Kloeffler. [L. A. T.]

KANSAS, UNIVERSITY OF:
May 22. Papers, by Mr. Randolph on Roads of France; Economic Influence of Roads, by J. LaMer. Discussion followed.
May 8. Papers, by J. R. Bunn on Petroleum in General, by J. R. Mahan on Methods of Drilling for Oil and by J. J. Jakowsky on Products and By-Products of Petroleum. [C. K. D.]

LELAND STANFORD, JR. UNIVERSITY:
May 14. Talk on Iron and Steel, by J. A. Kinkead.
May 21. Election of officers: E. J. Baughman, chairman and S. G. Pardee, secretary. [E. J. B.]

LOUISIANA STATE UNIVERSITY:
May 29. Election of officers: E. R. Ayo, chairman; J. D. Keen, vice-chairman; W. Sonnier, secretary; and T. N. Traylor, treasurer. Illustrated lecture, by W. Buhler on Military Roads. [C. C.]

MASSACHUSETTS INSTITUTE OF TECHNOLOGY:
April 10. Demonstration and lecture, by Mr. Brown of the Metal and Thermit Corporation on the Thermit Process of Welding. [F. C. S.]

MICHIGAN AGRICULTURAL COLLEGE:
June 2. Election of officers: E. C. Hach, chairman; C. H. Currie, vice-chairman; and C. R. Wiggins, secretary-treasurer. [E. C. H.]

MICHIGAN, UNIVERSITY OF:
May 12. Election of officers: E. Goodwiller, chairman; R. Nyman, vice-chairman; F. G. Schwalbe, secretary; and T. P. Russell, treasurer. Technical report given on results of research on cars according to S. A. E. specifications for car performance. Talk on general topics of the day, by Dean M. E. Cooley. [F. G. S.]

OKLAHOMA, UNIVERSITY OF:
April 12. Paper on Scale Prevention, by George L. Barker. Talks on Europe in Machine Construction, by I. Y. Posey and on Cutting Metals, by Prof. E. S. Davis. [F. E. W.]

PURDUE UNIVERSITY:
May. Illustrated lecture on the Buckeyemobile, by Prof. G. C. King. Election of new officers: Prof. L. V. Ludy, honorary chairman; W. F. Herdrick, chairman; H. Ayres, vice-chairman; H. S. Griner, recording secretary; O. Chenoweth, corresponding secretary, and M. H. Harig, treasurer. [M. H. H.]

RENSSELAER POLYTECHNIC INSTITUTE:
April 3. Description of the Wireless Telephone as Developed by the United States During the War, by Mr. Baldwin.
April 12. Visit by French members to U. S. Arsenal, Watervliet, N. Y. [C. G. B.]

TUFTS COLLEGE:

March 18. Election of new officers: Frank W. Lincoln, chairman; Theodore E. Baker, vice-chairman and treasurer, and William C. Moodie, secretary. [W. C. M.]

WORCESTER POLYTECHNIC INSTITUTE:

May 7. Talk by R. Sanford Riley on Experiences in the Performance Committee of the Emergency Fleet.

May 21. Talk on Patent Law and How to Obtain It, by Louis W. Southgate.

June 4. Informal talk by Major Victor E. Edwards, vice-president of the Morgan Construction Co. on his experiences at the Aberdeen Proving Grounds. [H. P. F.]

Classification of Membership

An analysis of the membership of the Society shows about one-quarter of the members holding the title of mechanical engineers in their work; about one-fifth are classed as executives; nearly one-tenth are presidents of corporations. Superintendents and managers are also well represented, and designers, consulting engineers and educators complete the list. The following is a tabulation of the number of members in the above classes:

EXECUTIVES—1896	
Presidents	733
Vice-Presidents	550
Treasurers	340
Members of Firms	153
General Managers	210
SUPERINTENDENTS—1256	
General Superintendents	173
Superintendents	757
Mechanical Superintendents	73
Works Managers	164
Foremen	89
CONSULTING ENGINEERS—660	
Consulting Engineers	475
Contracting and Consulting Engineers	142
Patent Attorneys	43
CHIEF ENGINEERS—630	
Chief Engineers	559
Assistant Chief Engineers	71
ENGINEERS—3852	
Mechanical Engineers	2692
Production Engineers	245
Testing Engineers	143
Engineers	623
Inspectors	149
DESIGNERS—502	
Chief Draftsmen	142
Draftsmen	176
Designing Engineers	150
Estimators	34
MANAGERS—880	
Managers	507
Sales Managers	159
Sales Engineers	214
EDUCATORS—423	
Professors and Instructors	379
Editors	44

Addresses of Members Required

Mail recently sent to the following members of the Society has been returned, address unknown. Any information regarding the present location of these members will be appreciated by the Secretary:

ADDRESS DOUBTFUL

Armaiz, Walter P.
Atkinson, E. S.
Austrom, Charles A.
Baker, A. J.
Baker, N. S.
Ballard, Fred. W.
Baxter, Henry N.
Beard, Theo. H.
Bechtel, John A.
Benjamin, Merrill G.
Bettis, William I.
Bevin, Victor de L.
Bird, John D.
Brady, G. S.
Brandel, Stanley W.
Broom, Benj. A.
Brown, John W., Jr.
Brown, Walter E.
Brownell, Fred. J.
Buell, Morris L.
Burtsell, V. W.
Byllesby, H. M.
Callesen, Wm. B.
Carlson, Carl T.
Carpenter, Chas. U.
Carpenter, Fred. S.
Carter, C. R.
Cather, Wm. A.
Claussen, Howard P.
Cochrane, Robt. B.
Cole, Winthrop
Corbett, W. V.
Croghan, John T.
Crary, J. H.
Crute, W. R.
Dedrick, Benj. W.
Dietrich, Fred C.
Dobson, Wm. J. M.
Doron, W. H.
Doyle, B. M.
Drew, Wm. N.
Du Barry, Ed. G.
Elsey, G. W.
Engel, Louis G.
Evans, Herbert W.
Eyre, Thos. T.
Fabens, Andrew L.
Farnham, V. B.
Flexer, S. E.
Foley, Louis J.
Fritts, C. E.
Gaines, Fred. F.
Galloway, Chas. D.
Gants, E. T.
Gildersleeve, Frank M.
Gladfelter, Herbert S.
Goedkoop, W. C.
Goldrich, Philip
Hall, Chas. A.
Hamilton, James V.
Harlow, Justin E.
Haynes, Chas. A.
Henning, Chas. F.
Henningson, Louis A.
Hinchey, H. John O.
Hoe, Robert
Horton, John T.
Hull, Foster J.
Hunt, Harry B.
Hunt, Wm. F.
Jacobs, Adolph
Jarrett, Hillard W.
Jennens, Arthur E.
Johnson, Joseph B.
Keating, Thos. E.
Lamont, Clarence B.
Lawrence, Samuel E.
Layng, Geo. H.
Lewis, J. Clifford
Lucey, E. A.
Ludemann, John E.
Lyon, Tracy
McFarlan, Edward
Mackenzie, G. Earl
Mackie, Daniel M.
Magille, Franklin P.
Matthews, Robert M.
Mayo, Wm. B.
Meyncke, Geo. M.
Nadler, Harry A.
Nash, Lewis H.
Newhall, Arthur B.
Nourse, Ralph C.
Oederlin, Fred.
Pratt, Henry F.
Richards, Arthur
Robertson, John C., Jr.
Ross, Delmar G.
Seaman, Frank W.
Simmering, S. L.
Simon, Cecil S.
Smith, Thomas W.
Smith, William Walker
Squire, Melford B.
Stevens, Wm. N. (N. Y. C.)
Thompson, John R.
Wall, William G.
Waite, Lorenzo E.
Walbridge, Arthur H.
Weber, John
Wells, Eliot C.
West, Arthur
Wilber, Dana W.
Wilbur, Ralston T.
Wilkie, Donald C.
Wood, Benj. F.
Wood, Roland T.
Woodward, Hiram W.
Yager, John E.
Zimmerman, Fred R.

ADDRESS UNKNOWN

Anderson, Herbert W.
Behr, Francis J.
Benson, Robert F. A.
Berry, Edgar H.
Chadbourne, John L.
Chapin, Harry A.
Dismukes, Albert R.
Eastman, Robert L.
Gallaher, Charles W.
Gates, Sam J.
Greene, I. C.
Guise, Hiram B.
Haines, Philip G.
Hird, George W.
Hosmer, Fred E.
Hughes, James N.
Husted, Clifford M.
Kinder, J. J. de
Kirsch, James L.
Lake, Charles W.
Lincoln, Howard A.
Logan, Orwell
Magie, William E.
Marrow, George P.
Moyer, Will D.
Ogg, James
Penney, Charles F.
Phipps, Walter
Schmidt, John D.
Scott, Rossiter S.
Scrugham, James G.
Szymanski, Casimir E.
Thomson, John
Thornton, Wm. M.
Zach, Louis M.

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications and positions listed below combine the services of the Society and of the Engineering Societies Employment Bureau, Room 903, Engineering Societies Building.

POSITIONS AVAILABLE

Stamps should be inclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society records.

COLD-STORAGE ENGINEER, capable of laying out piping and taking care of construction for cold-storage buildings. Location Jersey City. Apply by letter. G-0762.

WORKS MANAGER for plant manufacturing high-grade medium and heavy metal-working machinery. Must be at present similarly employed, and have had extensive machine-tool experience. Be good organizer with years of experience in handling men and have a plant with not less than 600 men under his direction. Location Middle West. G-0845.

MECHANICAL ENGINEER with tool and jig experience on tractors. Location Iowa. G-0211.

TOOL-ROOM Superintendent. Location Connecticut. G-0213.

CHIEF INSPECTOR to handle a force of approximately 100 piece-part inspectors. Location Connecticut. G-0214.

CABINET DESIGNER, man familiar with design, construction and manufacturing methods of phonograph cabinets. G-0215.

HIGH-GRADE MEN for department managers. G-0216.

DRAFTSMEN, experienced in plant-layout work. One expert on piping layout. Salary between $125 and $175 per month, depending upon man. Apply direct to Mr. L. H. Blouch, Marcus Hook Works, National Aniline & Chemical Company, Marcus Hook, Pennsylvania; and for personal interview, to either Mr. B. R. Hawley or Mr. R. W. Cumming, both of

whom may be found at the New York office, 21 Burling Slip. G-0217.

DRAFTSMEN, designers, and tool designers familiar with adding machines, typewriters, wrapping machines, etc. Salary in neighborhood of $35 to $38. G-0218.

A MAN who combines aptitude for writing with engineering training, preferably in mechanical engineering and including familiarity with power-plant practice. Commercial or selling experience, and originality and interest in new developments, technical and commercial, would be advantageous. State training and experience and if possible send samples of own authorship. G-0221.

SUPERVISOR OF GAGE DESIGN. Duties will be to standardize gage practice and supervise gage design in Ordnance Department. Applicant must have recognized administrative ability, as well as being thoroughly acquainted with gage design and gage manufacturing practice. Salary $5000 a year. G-0223.

DRAFTSMEN for engine department and on ships and docks. See Mr. Barnaby, Staten Island Shipbuilding Co., Port Richmond, Staten Island. G-0225.

SALES MANAGER for tool department of manufacturer making established line of pipe tools; particularly wrenches. Applicant must have wide business experience, knowledge of human nature, capable of assuming full charge of tool sales. Output of concern capable of unlimited expansion, domestic and foreign, and presents excellent opportunity to the right man. In answer, write full particulars as to characteristics, business history, references, qualifications, age and salary expected. All applications will be treated in strict confidence. Name confidential. G-0226.

DRAFTSMAN, familiar with production of automatic machines and screw machines, with two or three years' tool-room or machine-shop experience and as many years detail work on the board, and is familiar with keeping card records and making data tables. Salary $25 to $30, according to experience and depending on proven worth and ability of successful applicant; real prospects of advancement. Location Pennsylvania. G-0229.

TWO MECHANICAL ENGINEERS. One to investigate and develop power steam-boiler design and applications and preferably have had experience in original, scientific research and development work, as well as in practical mechanical design and in commercial engineering; the other man to collate and digest commercial and engineering information relating to boiler-plant practice and to write articles, handbooks, reports, etc. In applying for either position state fully training, experience, age and salary expected and refer to work done. G-0230.

MAN capable of designing hydro extractors used in laundries, woolen mills, sugar plants, etc. One thoroughly competent to handle this line of machinery entirely, doing the designing and all engineering work connected with it. G-0232.

DRAFTSMAN AND ONE MECHANIC, able to operate lathe planer, drilling machine, drill press and semi-automatic machinery. Develop into time-study man. Salary $28 to $30. G-0233.

LARGE MANUFACTURING FIRM in Middle West would like to get in touch with young men who are just finishing University courses in electrical or mechanical engineering, or who left their University courses to enter army or navy service and who are now looking for employment. Good opportunities will be open for the right men in sales, engineering, design and research work. G-0234.

OPERATING REFRIGERATING ENGINEER for 10-ton refrigerating plant at Cleveland, Ohio; 10-ton compressor is motor driven and supplies refrigeration to freezers and coolers used for storing fish. Man must understand electricity. Salary to start $35 per week. G-0235.

OPERATING REFRIGERATING ENGINEER for 10-ton refrigerating plant at Chicago, Illinois; 10-ton compressor is motor-driven and supplies refrigeration to freezers and coolers used for storing fish. Plant has one heating boiler and 6 electrically-driven elevators, capacity each 2000 lb. Engineer must take care of all equipment. State salary desired. G-0236.

DRAFTSMAN with experience in the design of wood-working machinery and circular saw mills. Prefer technical graduate. G-0237.

SHOP MANAGER AND DESIGNER. Man who has had much practical experience in building machine tools, especially engine lathes, and is thoroughly capable of obtaining best possible results from men under him. Location Cincinnati. G-0238.

ACCOUNTANT or ASSISTANT ACCOUNTANT with training and experience in large manufacturing concerns capable of taking charge of factory accounting in broad and coöperative spirit with factory manager. Position is open with concern located in Middle West and at present employing about 700. Applicant must state fully experience and salary expected. If applicant is considered he will be asked to make appointment with head of concern. G-0240.

SUPERINTENDENT for concern manufacturing precision tools, employing over 500 and business growing. Only men with this experience will be considered. Location outside of New York. State experience and salary expected. If applicant is considered he will be asked to make appointment with head of concern. G-0241.

COMPETENT DESIGNER with experience in rolling steel-shutter design, to develop for old-established company in neighborhood of New York, a new line of shutters. State salary, and when free. Permanent position to right man. G-0242.

ENGINEER thoroughly familiar with distilling, evaporating and drying machinery. Must be capable of taking charge of entire evaporator department including engineering and selling. State full particulars—age, salary expected and where employed. Name strictly confidential. Location New Jersey. G-0244.

EMPLOYMENT SUPERINTENDENT to create and operate bureau for very large metal-working concern in Philadelphia. Salary, small; but substantial increases will be made as development progresses. Prime requirements are a scientific mind and an engineering education. State: age; dates, schools, subjects, approximate grades, and degrees; places of employment and approximate weeks spent in each duty. G-0245.

INGENIOUS MECHANICAL DESIGNER on small intricate and complicated mechanisms. Young American, preferably technically educated, who has sufficient analytical and inventive ability to attack mechanical problems successfully. Drafting ability not required; the man wanted should be capable of providing ideas for several draftsmen to work out. State age, experience and patents taken out, if any. Salary $2500 to $3000 to start; advancement will be dependent on productivity. G-0246.

DETAILERS wanted in drafting room of plant manufacturing small brass technical instruments. State experience and salary expected. Location Pennsylvania. G-0247.

CHIEF DRAFTSMAN. Competent to design special tools, jigs and fixtures; one who can develop competent working drawings covering entire product of plant manufacturing small brass technical instruments. State experience and salary expected. Location Pennsylvania. G-0248.

EXPERIENCED GRADUATE ENGINEER to test, supervise and improve the operation of steam-power and gas-producer plants at number of different works of large corporation. Work will also embrace technical control of large steam-power plants, melting, heating, and annealing furnaces, gas-producer plants, cleaning of producer and flue gases and smoke prevention. Ability to make and carry out suggestions to reduce power-plant and furnace-operating costs particularly desired. Man who fills this position will be asked from time to time to make suggestions and give advice in connection with designing of new plants. R-762.

EFFICIENCY ENGINEERS. Must have thorough knowledge of time and motion study; able to set rates accurately; analyze any job into its minutest details, and to describe them concisely. Very good opportunity. Location Cleveland Manufacturing Plant. Give age, education, previous business experience, date available and salary desired. R-866.

PROGRESSIVE ENGINEER with ideas, and experienced in farm-engine development. Experience in automobile engine designing and manufacturing desirable. Give complete experience, references, compensation, etc., in first letter. R-869.

ASSISTANT DESIGNING ENGINEER, on Semi-Diesel engine work. A man of ideas and capable of individual work, with large and long-established company. To save time, give full information in first letter. R-870.

WORKS MANAGER OR GENERAL SUPERINTENDENT. Applicant must be technical graduate and capable of earning from $5000 to $8000 per year, preferably employed at present time and receiving such compensation. The Works consist of large machine shop and foundry, manufacturing well-known power-plant equipment. Applicant please state age, education and experience in detail. All communications will be treated in strict confidence. This is good opening for an experienced manager and only those who are thoroughly qualified to fill it need reply. R-871.

TECHNICAL GRADUATES IN MECHANICAL ENGINEERING of classes of 1918 and 1919 are desired in engineering department of manufacturer of recording meters and power-plant equipment. Character of work offers good inducements, experience and future. An opportunity for engineering graduates recently released from Government service. Location Ohio. R-865.

PROFESSOR OF INDUSTRIAL ENGINEERING with practical experience in modern production methods and also teaching experience to take charge of industrial shops and the direction of the Industrial Engineering Course, in an eastern Technical Institution. R-827.

DESIGNER AND DRAFTSMAN. A firm building high-grade steam engines and other machinery for many years, has re-organized its engineering department. It wishes to consider the application of men with some experience along the above line with a view to advancing them as rapidly as their ability and efforts will warrant. Give full particulars regarding age, nationality, preparation for the work, detail past experience, by whom employed and for what periods, and salary desired. Location Alabama. R-838.

SALESMAN, familiar with the trade in the metropolitan area to represent a company manufacturing high-speed steel. Location New York State. No salary, straight commission. R-878.

ASSISTANT SHOP SUPERINTENDENT. Recent college graduate, preferably one with one or two years' practical experience since leaving college to work into the superintendency of a department in a packing company. Young man with natural mechanical bent and one who can tactfully handle male and female employees, desired. Location New York State. R-879.

ASSISTANT PROFESSOR IN MECHANICAL ENGINEERING and capable of taking charge of junior and senior classes in thermodynamics, steam engineering and mechanical engineering laboratory. Must be a graduate of mechanical engineering from first-class engineering school and should have four or five year's experience. Interest in experimental and research work desirable. Salary available largely dependent upon qualifications of the man chosen, but probably in the neighborhood of $1800 or $2000 a year for ten month school year. R-839.

INSTRUCTOR IN MECHANICAL ENGINEERING. Recent graduate from first-class engineering school to handle, under supervision, elementary classes in kinematics and machine design with possibly a small amount of mechanical-engineering laboratory teaching. Must be a good draftsman; some experience in com-

mercial drafting room is desirable though not necessary. Previous teaching experience not necessary. Salary about $1000 or $1200 for ten-month school year. R-840.

INSTRUCTOR IN MECHANICAL ENGINEERING. Recent graduate from recognized engineering school to handle, under supervision, elementary classes in steam engineering and mechanical engineering laboratory. Some machine-shop or power-plant experience is desirable though not necessary. Previous teaching experience is not necessary. Salary about $1000 or $1200 for ten-month school year. R-841.

MECHANIC. Mechanical and electrical engineering experience in blacksmithing, drill sharpening, operation and repair of all kinds of machinery, including electric and steam machinery, insulating, lighting and switchboard systems. Healthy young man of good habits and character desired. Two-year contract. Location South America; salary $150 plus board and lodging. R-851.

MECHANICAL DRAFTSMAN with some experience in mechanical and electrical engineering work. Duties will consist of designing electric hoists and power checks and in figuring stresses. Location Connecticut; salary $35-$40 per week. R-855.

DEVELOPMENT ENGINEER experienced in woolen industry and also with chemical experience, particularly along the line of bleaching animal fibers. Duties will consist of developing more efficient methods of sorting, classifying and bleaching Russian bristles. Location New Jersey; salary $175-$200 per month plus bonus. R-874.

SHOP FOREMAN experienced in polishing, and abrasive work. Must be able to make exhaustive studies of various propositions arising in connection with shop work. General shop knowledge and experience on time-study work and teaching of mechanics will be of advantage. Man about 30 years of age desired. Location New Jersey; salary $175-$200 per month. R-875.

MOTION-STUDY ENGINEER with extensive experience in shop operation and motion study. Must have sufficient technical experience to recognize inefficiency and waste in plant. Location New Jersey; salary $175-$200 per month. R-876.

SALES ENGINEER. Must have had sales experience, to handle complete line of contractors' equipment such as steam shovels, mixers, etc. Location New York City; salary straight commission. R-867.

EXPORT SALESMAN. Must be technical graduate experienced in fuel oil export work. Selling experience and ability necessary. Location New York City. R-783.

TIME-STUDY MAN with experience in drafting and layout work. Location Akron, Ohio; salary about $150. R-798.

SAFETY INSPECTOR. Must have a sufficient amount of machine-designing experience to enable him to design safety appliances or guards to machinery wherever found necessary throughout the plant. Location Akron, Ohio; salary about $150 to $175 per month to start. R-799.

SUGGESTION INVESTIGATOR, mechanical engineer preferred. Location Akron, Ohio; salary $150-$175 to start. R-800.

STUDENT ENGINEER for work in oil fields. Must be willing to work with his hands as well as his head; good future. Location Texas; salary $4 per day. R-812.

SALES ENGINEER to handle special electrical apparatus which sells for $700 per unit. Location New York City. R-835.

METALLURGICAL ENGINEER, technical graduate with at least two or three years' practical experience in operation of zinc smelters. Duties will be to take charge, under the guidance of superintendent of smelter of operating end of furnaces, and the roasting kilns, as well as mix room and ore crusher. Man desired should not be over 30 years of age and should be progressive and able to handle men. Salary $250 per month; location Oklahoma. R-877.

ASSOCIATE PROFESSOR OR PROFESSOR OF STEAM ENGINEERING; salary $3000 to $3500. Duties include supervision of classroom and laboratory courses in steam engineering. Candidates should have had excellent academic and practical training and experience, and they should be recognized authorities in steam engineering. Ability and interest in research are essential. R-884.

ASSISTANT PROFESSOR OF MECHANICAL ENGINEERING; salary $2500. Duties of a general nature, including work in thermodynamics, gas-power engineering, mechanical-engineering laboratory, etc. Candidates should have had such training and experience as to give promise of further growth and development in their work, and they should have done more than routine teaching. R-885.

ASSOCIATE IN EXPERIMENTAL ENGINEERING; salary $2000 to $2400. Duties include class-room work in steam engineering or heating and ventilation and general mechanical engineering laboratory courses. Successful teaching experience is essential. R-886.

THREE INSTRUCTORS; salaries $1500 to $1800. Duties include courses in steam engineering, gas-power engineering and mechanical engineering laboratory. Proper training, some practical experience, and not less than one year of successful teaching experience are essential. R-887.

SUPERINTENDENT OF THE MACHINE SHOP; salary $2200. Duties include general instruction and supervision of courses in machine shop practice and management. A young man who is experienced in the shop processes and methods, and who has a good understanding of the problems of shop management, is desired. R-888.

SUPERINTENDENT OF THE FOUNDRY; salary $2200. Duties in the foundry, similar to those described under the preceding position. R-889.

ASSISTANT SUPERINTENDENT OF THE PATTERN SHOP; salary $1500 to $1800. Duties of the position include instruction in pattern-making and carpentry. R-890.

DRAFTSMAN AND SCIENTIFIC ASSISTANT; salary $1200 for twelve months' service, with one month's vacation on pay. Duties include general drafting work and some assistance as an observer on experimental investigations. A recent graduate with some drafting-room experience is desired. R-891.

ASSISTANT TO THE DIRECTOR OF THE ENGINEERING EXPERIMENT STATION at a salary of $2500 to $3500 a year of twelve months, with one month's vacation on pay. The duties of this position include the supervision of editorial work, and the publication and distribution of bulletins, together with a limited amount of teaching in any branch of engineering. Man must have some facility at technical writing, and preferably some actual editorial experience on a technical journal. He must have a prepossessing personality, tact, good judgment and business sense. Ultimately this man may be assigned duties involving the establishment of more direct relations between the industries of the State and the Station, which will require many of the qualifications of an engineering salesman. R-826.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 12th of the month, and the form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

ASSISTANT TO GENERAL MANAGER or superintendent. Technical graduate with years of practical experience in design and manufacture of various types of mechanisms. Special ability in development of labor-saving machinery. Charge of test work and problems dealing with best processes of doing work. Good executive, pleasing personality, very successful in handling shop problems. Thoroughly familiar with factory layouts. High operating efficiency. At present in charge of important production work for ordnance department. G-469.

PLANT MANAGER, broad experience with large organizations. Active and progressive executive with successful record in handling labor. Practical knowledge of up-to-date manufacturing in all its branches. Experienced in manufacture of special machine tools, electrical machinery, motors and parts. Only high-grade connections will be considered. American, age 42. G-470.

MECHANICAL ENGINEER, technical graduate, age 32, desires position in sales, maintenance or purchasing department of engineering corporation. Ten years' experience in drafting, office and field work pertaining to power plants. Capable of handling men and planning work. Location New York. G-471.

INDUSTRIAL MECHANICAL ENGINEER. Graduate mechanical engineer, experienced in design, construction and operation of plants working on new processes requiring application of new and unusual principles, improvements in efficiency and safety of operations, familiar with heat transfer apparatus, chemical bacteriological and distillation methods; executive work and research. G-472.

AERONAUTICAL ENGINEER. Graduate mechanical engineer, experienced in aerodynamic research, wind-channel operation; familiar with aerodynamic theory, instructor in aerodynamics. Position desired with aeronautical-manufacturing firm or with engineering school about to start course in aerodynamics. G-473.

MECHANICAL ENGINEER as sales engineer, buyer, or executive. Has had broad-gage business experience, eleven years for one concern as executive salesman, including cost accounting and price-making; five years as treasurer and manager; five years in advertising catalog and publicity work. Some experience in construction, heating, lighting, plumbing, sewerage disposal and water supply. Would act as New York representative of worth-while proposition. G-474.

TECHNICAL GRADUATE with power-plant testing, operation and installation experience wishes position with any large concern where his experience may be used. G-475.

DESIGNER of automatic labor-saving machinery for quantity manufacture of precision parts; experienced in heavy machine tools, jigs, fixtures, bakelite, celluloid, compound molding, hydraulic presses, experimental development and research work. Inventive and resourceful originator. Has held shop and sales position. Available at once. Salary $3000. Location, Newark or New York. G-476.

EXPERT EXPERIMENTER AND DESIGNER on measuring instruments and methods of physics and mechanical engineering, desires position involving research or development problems. Excellent record of published work and invention. Salary $40.00, or will undertake investigations as consultant. G-477.

MECHANICAL ENGINEER, age 28, graduate 1914; structural and electrical experience. Honorably discharged from Navy as chief electrician. Best references from former affiliations. G-478.

EXECUTIVE, as maintenance and cost engineer by competent man of long experience released from war service. Specially qualified as paper maker or shipbuilder. Salary of minor importance if given percentage of savings or increases in profitable production. G-479.

SUPERINTENDENT or MASTER MECHANIC or similar administrative position by vigorous man of character and ability; man of wide experience, thorough mechanic, and a proven executive; experience covers blast furnaces, mines, quarries, railroad, water works, general construction and general shop work. G-480.

COLLEGE GRADUATE in mechanical engineering, Pennsylvania State College. Experienced in railroad-shop drafting, survey and topography work; single; age 23; reference of character and work done before enlisting. Expect to be mustered out of the service about July 15, 1919, after 23 months' service overseas with 19th Railway Engineers. Prefer

position with some large contracting company in hydroelectric work, or on some reclamation project, in United States or any foreign country. G-481.

MECHANICAL ENGINEER. Technical graduate, age 24, with steam-engineering and grinding-machine experience, desires position in engineering or sales engineering. Salary $1200 to start. G-482.

ASSOCIATE MEMBER DESIRES POSITION as superintendent of construction or management of general shops; ten years' experience in Latin America on big work—sugar mill and ship repair. Speaks and writes fluent Spanish and can take charge of large work and show results. Age 33, married. Would expect salary of $6000. G-483.

MECHANICAL ENGINEER, young, 3 years shop, erecting, drafting and designing experience; 2 years engineer officer U. S. Navy. References state "good organizer, initiative, executive ability"; capable of taking charge of 500 or more men. Holds unlimited marine engineers license. At present Lieutenant U. S. Navy. Expect release by September 1, 1919, possibly earlier. Minimum salary $2800. G-484.

WORKS ENGINEER desires position with large, progressive, manufacturing concern. Graduate of Stevens Institute, age 30, married. Seven years in charge of construction, maintenance shops, power house, private railroad, motor vehicles, operation of mechanical equipment, roads and grounds at large plant. Successful executive, acquainted with modern business methods. Army officer, just released after nearly two years' service. G-485.

TECHNICAL GRADUATE, 1919, with three years' general shop experience, desires position as assistant to mechanical engineer. Not afraid of work. Eastern location desired. G-486.

MECHANICAL AND ELECTRICAL ENGINEER. Has worked as manager, executive, salesman engineer and on construction in every state in United States, Canada, Mexico, Central & South America and several foreign countries. Major Ordnance Department, U. S. A., during 17 months, with honorable discharge. Desires position with manufacturing company in the United States or with concern having foreign branches, either as executive, manager, salesman or engineer. G-487.

MECHANICAL ENGINEER. University graduate, desires position as executive or designer in automotive industry. Six years' experience in production and design of mechanical and electrical equipment. Location Middle West. Salary $2500. Available September 1st. G-488.

MECHANICAL ENGINEER. Technical graduate, age 30, just returned from inspection of duplicate parts of ordnance material for Navy Department. Three years experience in steam-power and refrigerating-plant operation and maintenance, and three years in designing and erecting elevator safety appliances, wishes to become connected with growing concern having good opportunities for future. G-489.

MECHANICAL ENGINEERING GRADUATE, age 26, married, desires position having good future possibilities with consulting engineer or large company connected with petroleum industry. Good references. Four years' experience in construction and consulting work in other lines. Location in Mid-Continent field preferred. G-490.

MECHANICAL ENGINEER, 1916 graduate, age 25, with 4 years' varied manufacturing and business experience, desires to enter organization of growing firm offering good opportunities for man of initiative, ability, and character. Capable and experienced metallurgist, metallographist, and test engineer with practical knowledge of heat-treatment control and quantity production of high-grade forgings and steel castings. One and one-half years' experience as estimator and engineering correspondent for large equipment company. Considerable experience in maintenance and safety engineering. Best qualified for development and experimental engineering work, or as assistant to busy executive. G-491.

ENGINEER graduate, 10 years with firm of consulting engineers as draftsman and principle assistant engineer on appraisals, steam and hydraulic power plants, reports, etc., supervising engineer on construction; member of firm of consulting engineers on similar work and also domestic heating and lighting installations. Major field artillery, A. E. F., and discharged as Lieut-Col. Desires position where above experience will be of value preferably with headquarters in Massachusetts; good salary with opportunity for advancement expected. G-492.

ASSISTANT MANAGER or assistant superintendent of industrial plant. Age 43; married; technical graduate. Six months reinforced concrete work in charge for owner; six years assistant engineer in charge of office, inspecting tunnels and houses, studying layout for completed tunnel line and grade of tracks; eight years engineer, chief draftsman as production engineer in charge of all contracts to completion, manufacturing pier shed doors, ferry-bridge machinery, electric-car barn equipment, etc. Salary to start $3000; location preferred Middle West or South. G-493.

MECHANICAL ENGINEER. Technical graduate, 40 years of age, at present employed as chief draftsman with large machine-manufacturing concern; 12 years' experience in designing high-power hydraulic turbines including centrifugal and propeller pumps and miscellaneous apparatus; also experienced in testing all kinds of machinery, desires responsible position as chief engineer or chief draftsman. G-494.

ENGINEER, EXECUTIVE or SALES, desires to connect himself in capacity of executive, sales manager or similar responsible position where executive ability as well as engineering and business experience is required. For the past year connected with Ordnance Department at Washington in charge of production problems in connection with manufacture of heavy artillery. Graduate mechanical engineer. Twenty years' experience in engineering work and in manufacturing both in metal and wood. Desire location in New England (Boston) or New York City if possible but not averse to moderate amount of traveling. Best of references can be given. Present salary $5000. G-495.

CHIEF DRAFTSMAN or DESIGNER; mechanical engineer; 39 years of age, with sixteen years' experience, desires a position with concern in livable locality. Prefer eastern Pennsylvania or northern New Jersey. Salary $2700 to $3000. G-496.

MECHANICAL ENGINEER of broad experience in mechanical engineering supplemented by excellent business experience, possessed of executive and administrative ability, seeks position as superintendent, or position of administrative capacity with manufacturing concern. Will terminate tenure of important position with large corporation June 15. Details of experience upon application. G-497.

MECHANICAL ENGINEER. Technical graduate with seven years' experience in the design, layout, and construction of various plants and engineering work. Last year and half in responsible charge of mechanical construction. Desire position in executive capacity or as assistant to executive. Unmarried. Willing to travel. Salary $3000. Available after July 15th. G-498.

MECHANICAL ENGINEER. Technical graduate, age 29, with 6 years' experience, including work as instructor in machine design, chief draftsman, research, experimental engineering, assistant factory superintendent, power-plant layout, engineer of plant, and general mechanical engineering. At present employed as engineer of plant with manufacturing concern in Connecticut but desirous of position in New York City or vicinity. Married, available immediately; minimum salary $2,000. G-499.

MECHANICAL ENGINEER. Technical graduate; aged 22; married. Very extensive knowledge of spoken and written Spanish. One year shop experience. Reliable references. Desires position in any branch of mechanical engineering with good opportunity for advancement. G-500.

EXECUTIVE ASSISTANT. Technical graduate, age 31, having eight years' business and professional experience in manufacturing industry desires connection as executive assistant to president or manager of industrial plant or public utility. Familiar with modern methods and qualified to develop and execute plans. Recently discharged as Captain in Ordnance Department, having held responsible position in munitions manufacture. Location desired, Atlantic Seacoast. Salary commensurate with opportunity for advancement and desirable connection. G-501.

MECHANICAL ENGINEER and EXECUTIVE. Technical graduate; aged 33, with 15 years of general mechanical experience from shop bench to the last position of chief engineer. Has full charge of design and production of machine tools and automatic machinery for modern manufacture. Planning, layout, maintenance and repair of mechanical equipment. Installation of cost systems. Thoroughly familiar with purchase and disposal of mechanical equipment. Competent on general mechanical engineering problems from drafting room to production end. Will go anywhere. G-502.

YOUNG ENGINEER, technical graduate, American, age 24, desires opportunity with engineering, industrial, or commercial concern, in technical or sales capacity. Experience, covering period of two years, comprises mainly shop practice and production engineering. At present employed as production engineer of small manufacturing concern. Would be willing to go abroad. G-503.

PRODUCTION ENGINEER or SUPERINTENDENT. An engineer of recognized ability, wishes to associate himself with reputable manufacturing concern that would consider an investment. With present concern 9 years. Thoroughly acquainted with up-to-date practice on brass foundry, pattern making, machining, interchangeable parts, punch-press work, costs, rate setting, planning, scheduling, etc. Location, Chicago. G-504.

TECHNICAL GRADUATE, aged 29, married. Nine years' experience in engineering including machine, jig and fixture design. Also one year as assistant efficiency engineer. Desires position as efficiency engineer or as assistant to mechanical engineer. Location preferred West, but would accept any desirable locality. At present employed. G-505.

WORKS MANAGER or assistant to busy executive. Age 31, married. At present employed as works manager by a prominent manufacturing concern. Ten years' experience covering a wide range of manufacturing in various executive positions. Location in the East. Salary $5000 to $6000. G-506.

MECHANICAL ENGINEER. Army officer, age 32, with 4 years' civil, 6 years' mechanical and electrical experience, including industrial plant construction, involving steel concrete, dock building, pipe work, machine shop, boiler plant, engine testing, installation, etc. Superintendent a. c. generating station supplying town light and power. Derivation of gases and experimental engineering. Desires to specialize. Strong in executive capacity, requiring broad engineering experience. G-507.

ENGINEER EXECUTIVE. Graduate mechnical engineer with 10 years' experience in plant engineering covering power plant, machine tools, foundry and textile machinery, maintenance and repair of all mechanical and electrical equipment, heating system and plumbing. Age 39. Salary $4000. G-508.

EMPLOYMENT MANAGER who has successfully installed and operated modern employment system in two well-known companies desires to connect with progressive firm. Has had practical mechanical as well as employment management experience. Thoroughly understands how to attract, select, retain and develop employees. G-509.

TECHNICAL GRADUATE, M.E., with 8 years' experience in designing and drafting automatic machines and factory equipment, 5 years' varied experience as machinist, 2 years in charge of assembling and inspection. Good knowledge of general shop practice. Age 32; married; desires positing relating to sales engineering. G-510.

MECHANICAL ENGINEER with 14 years' experience in mechanical and electrical engineering of power and general manufacturing plants. Specialist in operation and management of industrial power plants and manufacturing equipment. G-511.

SUPRINTENDENT or WORKS MANAGER. Technical-commercial education, and 22 years' practical experience in charge of plants employing over 5000 men. Expert on employing and handling labor and familiar with all cost systems. For past two years Major U. S. Army in charge of manufacture of artillery ammunition. Age 45. Minimum salary $7500 to start. G-512.

CHIEF ENGINEER or MASTER MECHANIC of central station or textile mill. 1st. Masters' License. American; 39 years of age; 18 years' experience on steam, electrical, also machine shop on turbines, engines, boilers, stokers, motors, switchboards, etc. Four years last place as chief electrical engineer. Can handle help to good advantage, purchase supplies and take general charge. Will go anywhere. G-513.

PRODUCTION ENGINEER, age 27, technical graduate; three years' experience following up production in machine shops of large steel corporation manufacturing interchangeable parts. Experience in planning, routing, scheduling, etc. Philadelphia location preferred. G-514.

ASSISTANT TO WORKS ENGINEER or general manager of industrial establishment. Technical graduate; age 27. Central station, drafting room and business experience; naval officer just released from active duty, desires position giving opportunity to demonstrate executive ability and offering good chances for advancement. Will go anywhere in United States. G-515.

ENERGETIC ENGINEER EXECUTIVE, technical graduate, Captain, U. S. A. to be released in July. Two years' service in storage and shipping work at American ports. Three years' additional practical experience with electrical and automobile manufacturing in production and purchase departments. Position desired with growing manufacturing concern. Age 28, married; location immaterial. G-516.

CHIEF ENGINEER of modern steel works with 26 years' engineering experience designing and installing all kinds of tools wishes to represent export house in Scandinavian country. G-517.

ENGINEERING EXECUTIVE; technical graduate, two years' experience in light interchangeable design of automobile starting, lighting and ignition equipment. Two years with Ordnance Department as designer, inspector and experimental engineer on guns, shells, hand grenades and special machinery. Has designed and had responsible charge of manufacture and testing of such experimental material. G-518.

EXECUTIVE. For last three years secretary-treasurer and office manager of plumbing, heating and power plants engineering and contracting company. Ten years' previous experience in charge of drafting department of large plant manufacturing valves and engineering specialties. Systematic, good organizer, unequalled on detail. Age 38. Initial salary of secondary importance. Seek opportunity to invest. G-519.

WORKS MANAGER or FACTORY SUPERINTENDENT. Age 33; technical training and wide experience as practical mechanic and plant engineer in manufacture of storage battery, track and road vehicles, electrical machinery, hoisting and conveying machinery; superintendent of erection, assistant mechanical superintendent of large textile and dye plant; works engineer on construction of large paper mill. At present factory manager in plant employing nearly 1000 workers and producing, in quantity, a line of high-grade ignition and lighting apparatus of interchangeable construction. Able executive, organizer and well versed in scientific management. G-520.

ASSOCIATE OR ASSISTANT PROFESSOR of mechanical engineering. Technical graduate with varied industrial and teaching experience, desires to again take up teaching work interrupted by service in army. At present employed. Possibility of securing pleasant living accommodations an important consideration. Married. Salary $200. G-521.

ASSISTANT ENGINEER on industrial work. Technical graduate; age 24, married. Has had three years' experience in machinery design, estimating and general mill engineering. Present salary $2100. G-522.

MECHANICAL ENGINEER OR CHIEF DRAFTSMAN, mechanical and electrical engineering graduate, now employed by Shipping Board, desires permanent position with concern that can offer good future prospects, which is of more importance than present salary. Twelve years' experience on marine work, particularly experienced in design of reciprocating steam and Diesel engines and auxiliaries. G-523.

MILL SUPERINTENDENT, with twenty-seven years' practical experience in an up-to-date mill producing tubes, rods, wire and shapes in non-ferrous alloys. Understands mill work from technical as well as from the practical standpoint. Familiar with several kinds of bonus systems and capable of supervising the installation of them. Age 43; available at once. Salary moderate. G-524.

TECHNICAL MECHANICAL GRADUATE, 1916, desires position as assistant to mechanical engineer or manager. Steam, hydroelectrical, and mining experience. Middle West preferred. G-525.

CONSULTING ASSISTANT. Columbia M.E. graduate. Recently discharged from service desires connection with firm of consulting engineers as assistant, where energy, initiative and common sense are chief requirements. One year's "practical" experience in central power stations, some machine-shop and drafting-room experience. At present employed as appraiser on power-plant equipment. Prefer location in West or Middle West. Age 24; minimum salary $160 per month. G-526.

ENGINEERING EXECUTIVE OR DESIGNER. Varied experience covering seven years of successful production of duplicate parts to close limits through tooling and methods. Technical graduate; age 30. Possess controllable amount of Yankee ingenuity and initiative. Salary $3000 in last position. Prefer New England or New York but will go anywhere. G-527.

GENERAL MANAGER. Capable of assuming entire charge of manufacturing establishment for mechanical, machine, or metal-producing company. Will reorganize or refinance if necessary. Experienced in building and handling large organization. Now Major Ord. U. S. A. Want proposition which needs rebuilding or new blood. Minimum salary $6000, prefer chance to acquire interest. Age 33 years; married. Any location. G-528.

CIVIL AND MECHANICAL ENGINEER; age 32; married; graduate Rensselaer Polytechnic Institute. Ten years' experience covering all phases of waterworks, design, construction and operation including design and construction of filtration plants for both municipal and industrial purposes, and heavy reinforced concrete construction. Experienced in design and layout of both steam and electric-pumping stations and steam power plants, and the purchase and installation of all classes of pumping machinery. At present employed, but for family reasons must locate in the vicinity of New York. Minimum salary $3000. G-529.

SALES ENGINEER desires to represent in Chicago, Illinois, district. Large concern manufacturing power-plant equipment, steam specialties, valves, fittings, etc. Eleven years' experience in electrical, mechanical, power plant, and factory engineering both in sales and construction. Now employed as factory superintendent and electrical-mechanical engineer. Technical graduate, age 33; married. Would consider salary and commission or strictly commission proposition. G-530.

ENGINEER; technical education; 12 years' experience in shop and drafting room, covering steam and electrical machinery, telegraph and telephone apparatus. At present chief draftsman in concern manufacturing high-tension electrical apparatus, having supervision of all design, wishes to connect with firm offering large opportunities to man with excellent experience, originality and executive ability. Salary $3000 to start. G-531.

FOREIGN SALES ENGINEER; electrical-mechanical, technically trained; American; age 36; married; unquestionable references; speaks Spanish and Portuguese fluently. Ten years' experience in South America and Europe; at present employed as export manager and salesman, having developed export department for present employers, wishes to change on account of present line being very limited. Desires to communicate with American manufacturer contemplating entering South American market on an extensive scale. G-532.

STEAM TURBINE ENGINEER; graduate of Columbia University; ten years' experience, mainly in testing and reports in steam power plants of various types, desires change to position of greater responsibility. Now employed as assistant to chief engineer in large street railway plant. Age 36; single. Location immaterial, except as governing minimum initial salary. G-533.

ASSISTANT SUPERINTENDENT; age 33. Eight years' experience in production work, covering planning, routing, cost, motion study, and estimating. Five years' previous general experience in shop work and design. G-534.

ASSISTANT SUPERINTENDENT OR CHIEF INSPECTOR; age 33 years; technical mechanical engineering education; 12 years' practical experience in design, manufacture and assembly of interchangeable parts on mass production; energetic, resourceful, efficient organizer; can furnish best of references. Desire position in or near Philadelphia. Reasonable salary. G-535.

POWER ENGINEER OR EXECUTIVE. Technical graduate. Eight years' experience in steam power-plant design and operation, familiar with industrial building layout and heating and ventilating as applied to manufacturing plants. Recently Captain in army in charge of design and operation of a two-million-dollar plant. Desire position of responsibility with an industrial concern, public utility company or consulting engineer. Age 30, married. Any location. Salary $3600 to $4500. G-536.

FACTORY MANAGER OR SUPERINTENDENT; 18 years' active manufacturing experience, from bench hand to manager. Thoroughly conversant with modern factory methods including organization, management, production, costs, employment traffic. Very successful as organizer, and in coördinating departments, maintaining a smooth-running, efficient, working unit. 38 years old; married. G-537.

ASSISTANT TO EXECUTIVE OR MANAGER of public utility or industrial corporation. Technical graduate; age 26. Has had experience on construction work and in various departments of large electric-light and power company. G-538.

MAINTENANCE OR WORKS ENGINEER; age 30. Several years in maintenance and upkeep of chemical industrial plant on explosives and allied products, power plant, light and heavy hydraulics, high-speed centrifugals, mixed-acid apparatus, and celluloid work; also knowledge of reinforced concrete construction. G-539.

TEXTILE ENGINEER, technical graduate, 35 years of age, with broad experience on woolens, felts and cottons and with some knowledge of jute, linen and worsted, desires connection with firm or individual in consulting capacity in development of special textiles or textile machinery. G-540.

SALES ENGINEER to represent substantial concern in Greater New York and northern New Jersey on commission basis and expenses. Graduated M. E., with shop and executive experience, practical, aggressive, persistent, knowledge of export trade, speaks French, Spanish, German and Russian. Has traveled abroad for English concern. G-541.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER JULY 19

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 198.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by July 19, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

Alabama

COHEN, BENJAMIN, Acting Personnel Director, Air Nitrates Corporation, Muscle Shoals
HARPER, CURTIS C., Steam Engineer, Woodward Iron Co., Woodward
HARRISON, JAMES H., Draftsman, Tennessee Coal, Iron & Railroad Co., Birmingham

California

BROWN, NICHOLAS E., General Superintendent, U. S. Electrical Manufacturing Co., Los Angeles
DOUGHERTY, ROBERT L., Professor, Mechanical Engineering, Throop College of Technology, Pasadena
GEARING, HARRY, Consulting Engineer, Los Angeles
KEESE, ROY B., Superintendent of Construction, Bureau of Power & Light, Los Angeles
VASILIEFF, PETER, Mechanic, Union Iron Works, San Francisco

Colorado

HART, FRED W., Farming, Brookridge Farm, Littleton

Connecticut

BLANCHARD, GEORGE W., Assistant Foreman, Waterbury Clock Co., Waterbury
CHEEL, HAROLD W., Laboratory Assistant in Mechanical Engineering, Yale University, New Haven
DAVIS, BERNARD E., Designing Draftsman, Plate Makers Product Co., Norwalk
GRIFFING, EBENEZER C., Cost Work Applied to Engineering, Winchester Repeating Arms Co., New Haven
HARVEY, WILLIAM H., Engineer, Columbia Graphaphone Manufacturing Co., Bridgeport
HEDGES, GEORGE L., 1st Lieut., Ordnance Department, U. S. A., Manager Stores & Scrap Division, Bridgeport
HUGHES, CHARLES W., Engineer of Tests, U. S. Government, Bridgeport
LEWIS, BRAYTON S., Chief Draftsman, Stanley Works, New Britain
McBRIAN, EDWARD W., Manager, The McNab Co., Bridgeport
MATHER, ROBERT H., Mechanical & Electrical Engineer, Ford Buck & Sheldon, Inc., Hartford
SELLEW, ROLAND W., Research Engineer, Fafnir Bearing Co., New Britain
TUTTLE, WILLIAM S., Engineer, Columbia Graphaphone Co., Bridgeport
WHEELER, JOHN R., Captain, Coast Artillery Corps, U. S. A., Mystic

Delaware

HOLT, JOSEPH H., Safety Engineer, Atlas Powder Co., Wilmington

District of Columbia

LUCKETT, DINWIDDIE J., Designer, Ordnance Department, U. S. A., Washington
McINTOSH, JOHN C., Engineering Draftsman, Ordnance Department, Washington
SPARER, J., Jr., Chief Draftsman & Designer, Ordnance Department, Chemicals & Loading Division, Washington
WILLIAMS, HAROLD E., Draftsman, Instrument Section, Engineering Division, Ordnance Department, Washington

Florida

CROSBY, HARRY P., Superintendent, Manater Fullin Earth Corporation, Ellentown

Illinois

ALTPETER, WALTER G., Designing Draftsman, Cameron Can Machinery Co., Chicago
COUCHMAN, CARL S., International Harvester Co., Chicago
COULTER, RAYMOND H., Assistant Naval Inspector of Ordnance, Goss Printing Press Co., Chicago
GOODENOUGH, GEORGE A., Professor of Thermodynamics, University of Illinois, Urbana
HARZO, LEROY F., Engineer, James O. Heyworth, Chicago
HAYNES, DAVID O., Jr., Industrial Engineer, Hasbrouck Haynes & Co., Chicago
HOWARD, KARL S., Mechanical Superintendent, Commonwealth Steel Co., Granite City
MAXFIELD, LEROY H., Mechanical Engineer, Illinois Glass Co., Alton
MORRISEY, JOHN E., Service Engineer, Diamond Power Specialty Co., Chicago
SEGUR, ASA B., Industrial Engineer, American Red Cross, Chicago

Indiana

CLARKE, ALLEN W., Local Engineer, American Car & Foundry Co., Jeffersonville
FUNK, ELMO A., Assistant General Manager, Hill Pump Works, Midwest Engine Co., Anderson
HAYNES, ELWOOD, President, Haynes Stellite Co., Kokomo

Kansas

BROOKS, LEO S., Master Mechanic, Sinclair Refining Co., Kansas City

Maryland

BECKER, H. KIRKE, Captain, Chemical Warfare Service, U. S. A., Baltimore
ELLICOTT, CHARLES E., President, Ellicott Machine Corp., Baltimore
HAGEMAN, DONALD, Mechanical Engineer, U. S. Industrial Alcohol Co., South Baltimore
HORLEBEIN, EDWIN W., Assistant Engineer, Dixie Manufacturing Co., Baltimore
HOW, HARLAN W., Manager, U. S. Naval Engineering Experiment Station, Annapolis
MAILLER, JAMES W., Captain, Ordnance Department, U. S. A., Aberdeen Proving Grounds, Aberdeen
SHAFFER, SPENCER, Chief Inspector, Production Division, Ordnance Department, Bartlett Hayward Co., Baltimore

Massachusetts

BURNHAM, EDWIN F., Supervising Engineer, The Russell Co., Boston
CALDWELL, STUART H., Newton Center
COGHLIN, PETER A., President & Treasurer, Economy Electric Co., Worcester
DE CLAMECY, PHILIPPE, Consulting Engineer, B. F. Sturtevant Co., Boston
DINSMORE, ELMER B., Lieutenant, Ordnance Department, U. S. A., Watertown Arsenal, Watertown
ELLIOTT, JAMES A., Chief Accountant, Cooley & Marvin Co., Boston
FRISK, RAYMOND C., Service Engineer, Cummings Ship Instrument Works, Boston
HERSEE, FREDERICK C., General Manager, Motor Specialties Co., Waltham
LINCOLN, FRANK O., Sales Manager, Morse Twist Drill & Machine Co., New Bedford
McGIRR, THEODORE G., General Manager, Usona Machine Co., Springfield
MALONEY, JOHN T., Chief Engineer & Electrician, Stevens Manufacturing Co., Fall River
MERRIAM, PAUL A., Sales Engineer, Nelson Blower & Furnace Co., Boston
PETERSON, C. EDWARD, Machine Designer, Norton Co., Worcester
PICKARD, GREENLEAF W., Consulting Electrical Engineer, Wireless Specialty Apparatus Co., Boston
RAYNOLDS, WILLIAM M., Assistant Manager, Deane Works, Worthington Pump & Machinery Corporation, Holyoke
ROWE, JAMES E., Appraisal Expert, U. S. A., Bureau of Aircraft Production, Boston

Michigan

BISCHOFF, JOHN M., Construction Engineer, Detroit Pressed Steel Co., Detroit
CONWAY, CHARLES E., General Manager, Precision Instrument Co., Detroit
DOBOSZ, JOHN A., General Superintendent, Metal Parts Manufacturing Co., Grand Rapids
KASSENBROCK, CHRISTOPHER G., Plant Layout Draftsman, Champion Ignition Co., Flint
VESSEY, RALPH B., Works Manager, Champion Ignition Co., Flint
WAKE, BURTON S., Foreman in Machine Shop, Wilson Foundry & Machine Co., Pontiac
WIBEL, A. M., Engineer, Ford Motor Co., Detroit

Montana

CAPRON, WILLIAM C., Mechanical Superintendent, Anaconda Copper Mining Co., Anaconda

New Hampshire

WISEMAN, JOHN T., Assistant Chief Draftsman, The Atlantic Corporation, Portsmouth

New Jersey

BRUEGGEMAN, ALBERT L., Mechanical Engineer, Butterworth Judson Corporation, Newark Transfer
BYRON, EDWARD, Instructor, Department of Physics, Stevens Institute of Technology, Hoboken
CAMPBELL, ALVIN A., Engineer and Secretary, Newark Wire Cloth Co., Newark
CATLIN, ROBERT W., 2nd Lieut., Air Service, U. S. A. Newark
CHAPMAN, WALTER W., Superintendent, Wm. H. Chapman, Newark
CLADE, ROBERT, Chief Engineer, Nixon Nitration Works, New Brunswick
FLACK, J. DAY, Major, Ordnance Department, U. S. A., Palisade
GROETZINGER, W. A., Production Engineer, Crucible Steel Company of America, Harrison
HARRISON, BENJAMIN R., Draftsman & Engineer, Warren Foundry & Machine Co., Phillipsburg
HENDERSON, WILLIAM A., Chief Draftsman, Taylor Wharton Iron & Steel Co., High Bridge
HERZ, CORNELIUS M., Installing Piece Work System, Edison Storage Battery Co., E. Orange
McINTYRE, WILLIAM J., Chief Draftsman, Thomas A. Edison, Inc., Bloomfield
SCHERER, HERMAN A. G., Designer, Ivers-Lee Co., Newark
SEARLES, HAROLDE N., Production Department, Worthington Pump Co., Harrison
METZLER, CHARLES L., Head Draftsman, Klaxon Co., Newark
ULRICH, THOMAS J., Designing Mechanical Engineer on Special Development Work, The Celluloid Co., Newark
VAN CLEVE, A. E., Works Manager, Crucible Steel Co., Harrison

New York

ADAMS, JOHN Q., Assistant to Superintendent, Methods Department, Watervliet Arsenal, Watervliet
BAILEY, JAMES, Designer of Mechanical Development Department, Corning Glass Works, Corning
BRACKETT, C. K., President, Brackett & Colt, Inc., New York
BRISTOL, RAYMOND W., New York Representative, Hess Steel Corporation, New York
CARTIN, JAMES D., General Superintendent, New York Air Brake Co., Watertown
COOK, FREDERICK B., President, American Mailing Device Corporation, New York
DAMM, WALTER W., New York

DEL FUNGO GIERA, PHILIP L. E., Ordnance Officer, Pelham
DIETER, CLIFFORD A., Time Study & Job Analysis, Art in Buttons, Rochester
DOMEY, JOHN P., Senior Inspector of Gages, Watervliet Arsenal, Watervliet
ECHIKSON, ELCHANAN, Member of Firm, J W. Bache, New York
EGBERT, PERRY T., Ithaca
ENSIGN, WILLIAM B., Plant Engineer, American Ever Ready Work of National Carbon Co., Long Island City
ERLINGER, GEORGE J., Engineer & Salesman, Community Machine & Tool Works, Inc., New York
FITZPATRICK, FRANK R., Assistant to Vice-President, Locomotive Superheater Co., New York
GEORGE, JOHN F., Tool Room Foreman, Watervliet Arsenal, Watervliet
HALEY, EUGENE M., Material Inspector, Naval Overseas Transportation Service, New York
HALL, EDWIN A., Superintendent, Power Specialty Co., Dansville
HAYES, ROY F., Mechanical Engineer, Bagley Sewall Co., Watertown
HORNE, GEORGE A., Manager & Chief Engineer, Technical Department, Merchants Refrigerating Co., New York
HOTCHKISS, TRACY J., Assistant Foreman, Toolroom, Watervliet Arsenal, Watervliet
JONES, HOWARD, General Foreman, Watervliet Arsenal, Watervliet
KRETZMER, JOHN L., Sales Engineer, Wheeler Condenser & Engineering Co., New York
LANK, CLARENCE H., Engineer, Todd Shipyards Corporation, Tebo Yacht Basin Co., Brooklyn
LEACH, FRANK L., Assistant Chief Draftsman, Perin & Marshall, New York
MAYER, HENRY C., Erecting Engineer, Shipley Construction Co., Brooklyn
METTLER, CHARLES G., Colonel, Executive Officer, Watervliet Arsenal, Watervliet
MITCHELL, GLENN D., Chief Engineer, L. W. F. Engineering Co., College Point
NEDELL, MARTIN F., Foreman & Assistant to Assistant Superintendent, C. J. Tagliabue Manufacturing Co., Brooklyn
PHILLIPS, WILLIAM H., Lieutenant, U. S. N., Surveyor on Ships, New York
SEAMANS, E. J., Superintendent, Breech Mechanism Department, Watervliet Arsenal, Watervliet
SEILER, GEORGE W., Assistant to Factory Manager, Harrison Radiator Corporation, Lockport
SMITH, JOHN D. L., Freeport
SMITH, MARSHALL M., Ensign, U. S. N. R. F., Naval Overseas Transportation Service, New York
STEINER, BARNET, Assistant to Foreman, Breech Mechanism Department, Watervliet Arsenal, Watervliet
THOMPSON, IRWIN P., Circulation Department, Iron Age Publishing Co., New York
TOTTIS, THEODORE J., Jr., New York
WIECHERS, MANOLA M., Engineer, American Steel Export Co., New York
WILLIAMS, ALBERT B., Construction Engineer, Motive Power Department, Interborough Rapid Transit Co., New York

North Carolina

SCHMIDT, KARL F., Mechanical Draftsman, Atlantic Coast Line Railroad, Wilmington

Ohio

BUBNA, RICHARD C., Special Machine Designer, Lynite Laboratories, Cleveland
EAST, WARREN E., Service Sales Engineer, Bailey Meter Company, Cleveland
FARQUHAR, LLOYD C., Captain, Ordnance Department U. S. A., Cincinnati
HILTZ, WILLIAM, Manager, The Certigraph Co., Cincinnati
HUNT, JOHN E., Engineering Officer, U. S. Navy, West Liberty
IRELAND, GEORGE E., General Manager, The Steel Products Engineering Co., Springfield
JOHNSTON, ROGER N., Assistant Manager, Stock Regulation Department, B. F. Goodrich Rubber Co., Akron
KREITZ, PAUL B., Squad Leader, Dye Design Department, Willys Overland Co., Toledo
MACK, CARL L., Junior Engineer, Henry L. Doherty Co., Toledo
NEEDY, JOHN A., Professor of Mechanical Engineering, Ohio Northern University, Ada
SNOW, WELTON A., Planning (Industrial) Engineer Department, Goodyear Tire & Rubber Co., Akron
ODERLUND, CARL, Draftsman, Goodyear Tire & Rubber Co., Akron
TIPPET, PHILIP U., Chief Engineer, Turner Vaughn & Taylor Co., Cuyahoga Falls
WALTON, EDWARD N., Sales Manager, The Ohio Blower Co., Cleveland
WILLEY, FRANK W., Senior Member of Firm, Willey-Wray Electric Co., Cincinnati

Oklahoma

STILLWELL, JERRY F., Engineer, Empire Gasoline Co., Bartlesville

Pennsylvania

EADES, JOHN A., Chief Draftsman, Bayless Manufacturing Corporation, Austin
ESTEP, THOMAS G., Jr., Assistant Professor, Mechanical Engineering, Carnegie Institute of Technology, Pittsburgh
GANT, H. P., Member of Firm, Lewis, Robinson & Gant, Philadelphia
LEH, HOWARD H., Superintendent & Engineer, Phoenix Portland Cement Co., Nazareth
MOORE, MORGAN M., Export Sales Manager, Mesta Machine Co., Pittsburgh
PARKER, HENRY C., Superintendent of Equipment, Frankford Arsenal, Philadelphia
PHELPS, STEPHEN B., Foundry Superintendent, Sharples Separate Co., West Chester
RICE, GEORGE L., Lieutenant of Engineers, Army Reserve Depot, New Cumberland
SANSON, FREDERICK B., Mechanical Engineer, Barrett Co., Frankford
SHINKLE, JAMES B., Rate Department, Westinghouse Electric & Manufacturing Co., East Pittsburgh
STRUCKENBRUCK, HAROLD C., Assistant Power Engineer, National Aniline & Chemical Co., Marcus Hook
THATCHER, CHARLES G., Assistant Professor of Engineering, Swarthmore College, Swarthmore
THAYER, PAUL G., Examiner, Emergency Fleet Corporation, Erie
WILLIAMS, GEORGE F., Supervising Inspector, Supply Division, Emergency Fleet Corporation, Philadelphia
WILSON, ORIN S., Department Head, Emergency Fleet Corporation, U. S. Shipping Board, Philadelphia

Texas

WADLEY, BROOKIN N., Salesman & Engineer, Keasbey & Mattison Co., Houston
WILSON, CHARLES S., Chemist Southern Pacific R. R. Co., Houston

Utah

ELFERS, GEORGE K., Manager, Diamond Potash Co., Salt Lake City

Washington

ALLBIN, SIM E. T., Chief Draftsman, H. W. Sumner Co., Seattle
DANIELS, RICHARD F., Tool Room Foreman, Stetson Machine Works, Seattle

West Virginia

GRIMSHAW, GEORGE F., Production Engineer, U. S. Naval Ordnance Plant, So. Charleston
HAYES, LESLIE D., Professor of Machine Design & Construction, West Virginia University, Morgantown

Wisconsin

CALLEN, THOMAS J., Jr., Insurance Adjuster & Counselor, Milwaukee
JACOBI, NICHOLAS E., Chief Engineer, Briggs & Stratton Co., Milwaukee
McGINNIS, WILLIAM J., Factory Engineer, Valley Iron Works Co., Appleton
MILLAR, WM. LLEWELLYN, Mechanical Engineer, Gisholt Machine Co., Madison
NELSON, CHARLES W., Manager Mechanical Department, American Appraisal Co., Milwaukee
OLDENBURG, HARRY F., Engineering Department, Federal Rubber Co., Cudahy
WEBER, JOSEPH A., Instructor in Mechanical Engineering, University of Wisconsin, Superior

Australia

MARCELLUS, ROY C., Chief Draftsman, Electrolytic Zinc Co. of Australia, Melbourne

Canada

MEDCALF, DUNCAN M., Chief Provincial Inspector of Steam Boilers, Province of Ontario, Toronto

Cuba

THOMSON, EDWARD W., Chief Engineer, Zaldo Martinez y Compania, Habana

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE MEMBER

California

HARDEN, FRANK W., Resident Hull Inspector, Hammond Lumber Co., Eureka

District of Columbia

PARIS, PERCY G., McAdoo & Paris, Washington
SNELLING, HENRY H., Engineer and Expert, Church & Church, Washington

Illinois

WACHS, THEODORE, Engineer, The E. H. Wachs Co., Chicago

New Jersey

GIBBONS, JAMES O. G., Mechanical Engineer, The Constructive Service Corporation of America, Newark

New York

LAWSON, JAMES T., Assistant to General Superintendent of Production, Public Service Electric Co. Newark

Ohio

CABLE, DAVIS A., General Superintendent, The U. S. Roofing Tile Co., Canton
LOCKHART, JAMES, Chief Engineer, The Lakewood Engineering Co., Cleveland

PROMOTION FROM JUNIOR

Alabama

LITHGOW, RICHARD P., Traveling Engineer, American W. W. & Electric Co., Birmingham

Michigan

MILLINGER, WILLIAM A. F., Special Oil Engine Development, Shaw Crane Works, Muskegon

New York

KARR, ALFRED D., Chief Engineer, Audiffren Refrigerating Machine Co., New York
KIMMEL, ALFRED W., Manager of Utica Office, The Chas. M. Kelso Co., Utica
REYNOLDS, PHILIP E., Member of Firm, Croll-Reynolds Co., Inc., New York
SCHEID, HUGO, General Manager, Deschanel Engineering Corporation, New York
TALBOT, JAMES M., Department Superintendent, S. S. White Dental Manufacturing Co., Prince Bay, S. I.

Pennsylvania

GREENE, GEORGE F., Assistant Manager, Nazareth Foundry & Machine Co., Nazareth
MARTIN, WALLACE H., Assistant Professor, Mechanical Engineering, Pennsylvania State College, State College
WATSON, J. EDWARD, Assistant Power Engineer, Barrett Co., Philadelphia
WHEATLEY, GEORGE S., Efficiency Engineer, Midvale Steel & Ordnance Co., Coatesville

SUMMARY

New Applications	179
Change of Grading:	
Promotion from Associate-Member	8
Promotion from Junior	11
Total	198

In Two Sections—Section Two

Volume 41 Number 8

MECHANICAL ENGINEERING

THE JOURNAL OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

August, 1919

Society Affairs

A Record of the Current Activities of the Society, Its Members, Council, Committees, Sections and Student Branches; and Affairs of Interest to the Membership

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
29 West 39th Street, New York

SOCIETY AFFAIRS

Affairs of Interest to the Membership — Secretary's Letter — Among the Local Sections — Student Branch Suggestions — Employment Bulletin — Candidates for Membership

The Secretary's Letter

THE secret of the Society's success is the complete opportunity of self-expression of all the members. Not only are all members encouraged to participate in the freest discussion of technical papers, which, of course, is one of the obvious objects of the Society, but there is similarly the freest opportunity for participation in the selection of officers and in the management of the committees and of the Society's affairs generally.

In the development of the correspondence columns of MECHANICAL ENGINEERING there is an opportunity for discussion without waiting for the two general meetings of the Society. This gives a more extended audience and permits discussion on any subject pertaining to either technical or Society affairs by those who could not get to meetings at all.

Publicity of Society affairs, the same as Government affairs, tends to their higher development, and members are encouraged to avail themselves of this opportunity.

Besides making MECHANICAL ENGINEERING the medium for general discussion, committees on standards, research, etc., can use it as a medium for communication on the development of the work of committees. In other words, the Society has set up the machinery and it is the property of the members, and it is to the members' benefit that they avail themselves of the facilities provided.

There are numerous other plans in the minds of both the Aims and Organization Committee and Publication Committee for making the columns of MECHANICAL ENGINEERING of greater service to the members, and, conversely, it is the duty of the members to secure the benefits from membership in the Society by contributing through the columns of MECHANICAL ENGINEERING their suggestions as to ways in which they can serve their fellow-members of the profession.

CALVIN W. RICE,
Secretary.

Among the Local Sections

BOSTON: (With American Institute of Electrical Engineers, Boston Society of Civil Engineers, Engineering Society of Western Mass., Providence Engineering Society and Worcester Section.)

June 27. June outing at Villa Napoli, Nantasket, Mass. Dinner and dancing.

BRIDGEPORT: (With American Society of Civil Engineers, American Institute of Electrical Engineers, Society of Automotive Engineers, and the Chemical Engineers of the vicinity.)

June 26. Mechanical Apparatus in the Treatment of the Wounded, by Dr. W. Gilman Thompson, of New York; and an original paper by Mr. Boeghold, read by Charles W. Hughes, on Investigation of Case Carburizing and Case Hardening.

ST. LOUIS:

July 10. Meeting at the Midland Valley Country Club. Dinner and dancing. C. F. Hatfield was the speaker of the evening.

The foregoing account of a few meetings held by the Sections since the last issue of MECHANICAL ENGINEERING is indicative of the close of the season, and the Sections' work in general is in the midst of the usual summer lull.

All but eight of the executive committees throughout the country have reported their officers for the coming year, and these committees are advised to utilize the summer months for the planning of their next season's activities. A summer activity which the Sections might profitably pursue would be the development of their membership. An application form is being printed in this issue of MECHANICAL ENGINEERING and the several good reasons for immediate action are given on the announcement pages at the front of Section One.

The Sections Committee has approved the publication of a Bulletin containing Sections data and this will be regularly distributed to the officers of the various Sections. This bulletin will be sent to any member of the Society upon request.

During the last month two petitions have been received for Sections, one from the members in southern Texas, with headquarters at Houston, and the other from the members in the vicinity of Portland, Oregon. The first of these was approved at the July meeting of the Executive Committee. As soon as the Portland petition is acted upon the Society will have thirty Sections, with meetings in thirty-three cities throughout the United States and one in Canada.

Thus far but four Sections have sent in their annual reports; but it is hoped to have sufficient number in hand to publish a digest of these in the September issue. Of those reports received, among the most interesting items are the following:

The San Francisco Section reports decided success with its plan of a weekly luncheon meeting of the Executive Committee, to which all members of the Section and visitors are welcome. The attendance has averaged from six to twenty-five. On December 4, 1918, the Joint Council of San Francisco Engineering Societies was formed for the purpose of fostering closer relationship among engineering societies of that city, especially in matters where coöperation will make for more efficient service to the state. A service bureau has also been established where a joint endeavor is made to provide a clearing house through which engineers in search of employment may be assisted. This bureau has devoted itself particularly to finding positions for returned engineer soldiers.

The Philadelphia Section has had a successful season, with the outstanding innovation a meeting held out of town, at Wilmington, Del. Other Sections are now discussing a similar procedure.

The Sections at Baltimore, Chicago, Cleveland and Detroit are all interested in joint activities with the engineers of those cities looking toward the erection or purchase of suitable buildings for use as homes for the engineers of those cities. One of the Sections established during the year (the Mid-Continent Section) held an unusually successful all-day meeting at which several papers were presented. The only other Section to attempt all-day sessions has been the Cleveland Section, which has twice held sessions beginning in the morning with technical papers and including excursions in the afternoon, with a dinner and speakers in the evening. The attendance at all of these meetings has been unusually large and approached that of some of the Spring Meetings of the Society.

Leland Stanford Jr. Student Branch Officers Constructive Suggestions

THE following suggestions for the purpose of determining the most successful changes in the present methods of operation and the possible improvements in the nature and scope of the activities of the student branch are taken from the constructive report prepared by the Leland Stanford Jr. Student Branch.

The branch committee which was appointed felt that a more thorough determination of these points might be made by consulting all the members of the student society and accordingly issued a questionnaire. This series of questions appears below, each being followed by a consensus of the general opinions advanced by the membership. Discussion of the report is encouraged.

1 *What is the earliest date in the engineering course at which a student can profitably join the A. S. M. E. Student Branch?* The earliest time to join the A.S.M.E. Student Branch is at the beginning of the junior year. By that time the student has thoroughly decided what department he desires as a major and is in a position

to realize the opportunities and limitations of his particular field. His scholarship and attitude toward the other members of the department will show whether or not he would become an active member of a student organization. The fundamental idea is not so much one of student affairs as one of furthering later professional associations and friendships.

2 *Should admission be free and voluntary when a student reaches this point, or be selective and invitational?* The membership should be elective. However, applications for membership should be available to all men upon becoming juniors in the department.

3 *What are the most profitable activities for the student branch?* The most profitable activities are the discussions by faculty members and practical men of affairs, which provide a means for the informal exchange of ideas and ideals, so important to the student in later life, and the opportunity of meeting former alumni and influential technical men.

4 *How frequently should meetings be held for the best results? At regular times?* Meetings should by all means be regular and as often as is necessary to keep up interest and foster progressive effort. This means at least three meetings in a month.

5 *How about papers by students on things they have seen or done themselves?* Papers by students should be encouraged. The ability to present an idea clearly and concisely in the *minimum* of time is a very essential part of modern successful engineering practice. When the membership is too large to allow all to present papers, it would be wise to limit this privilege to post-graduates and seniors.

6 *Would addresses on broad topics of importance to the engineer, such as conservation, labor readjustment, distribution of wealth, etc., interest the men?* Addresses on broad topics will serve to connect the specialized engineering field with the surrounding tributary and governing fields. Finance and labor are the student's future problems and he should start to think of them.

7 *Would greater interest in the parent society, such as recognition by publication, prize or scholarship, of the best student paper presented at the student branch meetings be desirable?* Recognition of the student branches by the parent society is desirable if for no other reason than to show the objective of the branch. Too often the student does not realize the importance of the work in hand relative to future problems of actual practice. Prizes for manuscripts, original research and exceptional scholarship are a means of fostering this interest. Invitations to meetings of the parent Society extended to the branch are also desirable.

8 *Suggestions, remarks, etc.?* An annual banquet accompanied by a general get-together of the various student branches, the faculties and interested alumni, has been found a success. A general "engineering smoker" in which students in all engineering courses take part has proved popular. Refreshments after meetings is still another suggestion. A definite executive organization that will include all alumni is especially to be desired.

CHEVER KELLOGG
E. J. BAUGHMAN
E. W. C. PEHL

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications and positions listed below combine the services of the Society and of the Engineering Societies Employment Bureau, on the sixteenth floor of the Engineering Societies Building.

POSITIONS AVAILABLE

Stamps should be inclosed for transmittal of applications to advertisers; non members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society records.

INSTRUCTOR IN MECHANICAL ENGINEERING; location Maryland. R-118.

MARINE ENGINE DRAFTSMAN; location Wisconsin. R-133.

STRUCTURAL DRAFTSMAN for position with iron works company. Location, Detroit, Michigan. R-140.

MACHINE DESIGNER capable of taking lead on heavy machine tools. Location Illinois. R-233.

DESIGNER AND DRAFTSMAN experienced in designing of buildings, conveyors, and machinery layouts in connection with pulp and paper mills. Location Wisconsin. R-249.

ASSOCIATE EDITOR OF TRADE PUBLICATIONS; technical graduate; under 30 years of age, of recognized college or university; discharged soldier, with two or three years' experience before entering the army preferred; must have good personality and command of English language; knowledge of photography, steam-heating and ventilating work desirable. Duties will combine field and office work. Location New York City. R-381.

POWER DRAFTSMEN wanted immediately for work in Wilmington Office of the E. I. duPont de Nemours & Co. Must be experienced men with thorough understanding of steampower layout and capable of designing and checking boiler house, power house, pump house, etc. R-473.

AUTOMOBILE DRAFTSMAN experienced on motor-truck work, chasses, transmission, axles and motors. Location New York City. R-752.

DRAFTSMAN experienced on power-plant work. Applicant having had experience in mechanical handling of freight desirable. Location New York City; Salary about $160 per month. R-776.

DESIGNER experienced in structural-steel work, figuring stresses. Location Connecticut; Salary $35 per week. R-856.

TOOL DESIGNER with extensive experience on punch and die work. Location New York City. R-858.

AUTOMOBILE ENGINE EXPERT with extensive experience in automobile engine line, particularly in connection with carburetors. Location Connecticut. R-860.

FOUNDRY SUPERINTENDENT capable of taking entire charge of plant, purchase equipment, etc. Location New York City. R-863.

MECHANICAL ENGINEERING GRADUATE of class of 1918 or 1919 is desired in engineering department of manufacturer of recording meters and power-plant equipment. Engineering graduate recently released from Government service will also be considered. Location Ohio. R-865.

SALES REPRESENTATIVE with knowledge of Spanish market, to represent manufacturers of electrical apparatus. Location Spain. R-872.

METALLURGICAL ENGINEER; technical graduate with at least two or three years' practical experience in the operation of zinc smelters. Duties will be to take charge, under the guidance of superintendent of the smelter, of the operating end of the furnaces, and the roasting kilns, as well as mix room and ore crusher. Man desired should not be over 30 years of age and should be progressive and able to handle men. Location Oklahoma; salary $250 per month. R-877.

SALES ENGINEER; technical graduate with domestic and foreign marketing, advertising and organization experience. Must also have experience in machine tools, automobile machinery and farming machinery. Location New York City. R-880.

FACTORY SUPERINTENDENT; must be familiar with both wood and metal construction. Young married man with technical training and some practical experience is preferred. Applicant must have highest qualifications and character. Plant employs 200 workers and manufactures heavy agricultural implements. Location Indiana. R-895.

MECHANICAL ENGINEER experienced in fruit drying and bleaching. Duties are to design and install complete factory equipment for factory to be erected in Spain. R-898.

SALES ENGINEER with two or three years' business training along engineering or engineering sales lines. Must be college graduate, 23-30 years of age. Location New York City; salary $25-$30 per week. R-900.

DRAFTSMAN experienced on detailing machine parts. Location New York City. R-909.

INSTRUCTOR IN MECHANICAL ENGINEERING with shop experience and executive ability, to have charge of placing co-operative engineering students in industrial establishments. Must have personality that will enable him to make connections with industrial concerns, and to maintain the present system which has been in operation for 13 years; will be required to meet classes in the University, and to discuss subjects related to the practical work of the students. R-917.

COST AND ROUTING ENGINEER with experience in manufacturing costs to make recommendations as to best methods of routing material through factory of manufacturer of fine stationery. Candidates should know details of paper business and printing, and be able to work out suggestions for improving machinery and for reducing cost of manufacturing, handling, packing and loading of writing paper products. Location Mass. R-918.

MECHANICAL ENGINEER experienced on construction work and factory buildings, small machines and plant layouts for position with chemical manufacturing plant. Location New Jersey. R-925.

DESIGNER to do designing and checking of oxy-acetylene apparatus. Man with technical education desired, although one with good practical experience would be considered. Location New Jersey. R-929.

DESIGNER AND DRAFTSMAN experienced in steam engineering on equipment and piping, for position with industrial plant manufacturing dyes, acids and chemicals. Location New Jersey; salary $120-$180 per month. R-930.

ASSISTANT FOUNDRY SUPERINTENDENT in charge of castings division of a U. S. Arsenal. Duties wil be to have charge of molding, cleaning and finishing in foundry making steel, iron and nonferrous castings weighing from $\frac{1}{2}$ lb. to 100,000 lb. each. Man with technical education preferred. Location Mass. R-931.

MECHANICAL AND CIVIL ENGINEER, not over 26 years of age, single, American; previous experience not essential. Location Far East. R-935.

DESIGNER for layout work, with thorough experience in industrial plant engineering work, more particularly of a mechanical nature and also with experience in electrical work; preferably technical man. Location Ohio. R-939.

ENGINEER with considerable experience on automobile transmissions. Location Canada. R-941.

ENGINEER who can invest $10,000 in an established company; one capable of selling and superintending installations of a combustion control system, who is acquainted with the best firing methods for power plants and thoroughly familiar with the details of operation. Location Philadelphia. R-946.

DISTRICT SALES MANAGER; must be good executive, thoroughly familiar with modern sales methods and experienced in power-plant and combustion engineering. Location Michigan. R-947.

SALES ENGINEER; technical graduate who has specialized in power-plant and combustion engineering. Must have good address and be either experienced salesman or prepared to take course of training. Location Michigan. R-948.

DESIGNER AND CHECKER experienced on rolling-mill and steel-works design. Location, Pennsylvania. R-950.

CHIEF ENGINEER. Position as member of staff of technical department of Vacuum Oil Co., Pty. Ltd., in Australia, open to a broad-gage engineer with a number of years' practical experience. Applicant should have a thorough technical training and at least ten years' experience with power-plant and other classes of machinery. Position will involve direction of lubrication engineers on service work and also a large amount of personal field work. Consideration will be given only to men with executive experience and a thorough appreciation of the sales value of engineering service. Application by letter only. R-958.

DRAFTSMAN; recent graduates in mechanical engineering. Location Connecticut; salary $25-$30 per week. R-973.

TOOL DESIGNER with extensive experience on production tool, cutting tool, gages, jigs, automatic machinery, etc. Location Connecticut. R-974.

DRAFTSMAN with extensive experience in the designing of blast furnaces, steel works, or rolling-mill work. Location Pennsylvania. R-975.

MECHANICAL AND ELECTRICAL ENGINEER with experience such as would fit applicant to inspect fire-alarm systems and apparatus. Man from 35-40 years of age desired. Travelling position. R-977.

SALES ENGINEER with practical experience in variety of engineering manufacturies, together with organizing and sales experience in equipment of this nature. Salary $4,000-$4,500 per annum. R-978.

ASSISTANT SUPERINTENDENT experienced as production engineer in the manufacture of welded steel tube and steel stampings. Location Connecticut. R-980.

MECHANICAL ENGINEER; must be college trained man with several years experience on steam engineering. Must know pressure gages and safety valves thoroughly. Location Connecticut. R-988.

DRAFTSMAN; technical education; either recent graduate or man having one or two years' practical experience on punching, shearing, bending or forging machinery. Location Middle West. R-989.

SUPERINTENDENT experienced in manufacture and production of steel-tank work. These tanks are made of plate steel and steel heavier than ¼-inch metal with welded instead of riveted seams. Location Ohio. R-990.

DRAFTSMAN, preferably one with thorough experience in designing of marine, diesel or steam engines of large sizes. Location Connecticut. R-992.

INSTRUCTOR IN MACHINE DESIGN; must be graduate of accredited engineering school. Position is instructing machine design and allied subjects. Location Pennsylvania; salary $140-$180 per month. R-993.

INSTRUCTOR in steam power-plant subjects; graduate of an accredited engineering school. Location Pennsylvania; salary $140-$180 per month. R-994.

SALES ENGINEER; must have good knowledge of internal-combustion engines, principally from the practical end; must have had some actual selling experience and must be capable of handling high-grade prospects. Duties will consist in following the motor-oil development work among manufacturers, securing tests through the engineering departments, furnishing lubricating information to service departments, and finally selling to purchasing agents. Applicants must present good personal appearance, have a good deal of initiative and must be capable of assuming responsibility. Man between the ages of 26 and 30 years desired. Location Middle Western or Eastern territories. R-995.

SALES ENGINEER; must have good theoretical and practical experience on internal-combustion engines; must be a graduate of good technical college, and have had several years' experience in factory work in connection with internal-combustion engines; should also be good salesman and capable of assuming responsibility. Duties will consist in travelling from home office to conduct dynamometer tests among motor manufacturers; to conduct comparative tests to determine the proper grades of oil for different motor purposes; to chart recommendations for both motor vehicles and tractors, and to act as engineering advisor on motor-oil questions. R-996.

TIME KEEPER AND CLERK; technical graduate who can speak Spanish. Duties will be to act as time keeper and to do other allied work in connection with the construction of oil-pipe lines and pumping stations which construction will be in progress for about 6 months. Location Mexico; salary $120 per month plus board and lodging. R-1005.

POWER-PLANT APPRAISERS experienced on power-plant appraisal work. Discharged soldier preferred. Location, Pennsylvania. R-1008.

ASSISTANT PROFESSOR experienced in teaching mechanical or electrical engineering subjects. Location California; salary $2,000 per year. R-1009.

SHOP SUPERINTENDENT with extensive experience in general shop and repair work of all sorts. The shop repairs and reconstructs sugar-mill machinery and makes a lot of miscellaneous minor parts of such equipment in connection with contracts for the equipment of sugar mills. Good practical knowledge of Spanish necessary, so as to be able to handle employees. Location Cuba; salary $7,000-$8,000 per year. R-1015.

DRAFTSMAN; experienced in steam and electric power-station work desirable, but not absolutely necessary. Essential that applicant be able to turn out neat drawings and do good lettering. Location Illinois. R-1016.

DRAFTSMAN experienced in laying out motors and gear drives. Location New Jersey; salary $40 per week. R-1017.

OPERATING AND ADMINISTRATING ENGINEER; must be technical graduate, with at least three years' experience in large steam power-plant work, where 30,000 kw. units are installed, capable of generating 200,000 h.p. Location Ohio. R-1018.

DESIGNER, DRAFTSMAN AND ESTIMATOR experienced on sugar machinery. Location New York City. R-1019.

DESIGNERS AND DRAFTSMEN experienced on crane and derrick work; who understand design, detailing and manufacturing of locomotive cranes, steam shovels, caterpillar tractors; experienced in structural steel design; [illegible] gear-train work; men experienced in structural steel and mechanical [illegible] layouts; and men experienced [illegible] work, weighing up to [illegible] City. R-1023.

PRACTICAL FOUN[illegible] whose training qualifies him to lo[illegible] the proper mixing of charges, cupola [illegible]duction, making of molds, cores and patterns, supervision of labor and making up of cost estimates. Position is one of general assistant. Location Mexico. R-1029.

FACTORY SUPERINTENDENT experienced in substituting mechanical equipment for hand labor. Preferably college graduate familiar with all kinds of conveying and handling equipment; also familiar with handling costs. Vicinity of New York City. R-1030.

INSTRUCTOR IN RADIO TRANSMISSION experienced in and knowledge of the theory and practice of radio transmission, including theory of transit electric phenomena. Man with practical experience with military uses of the radio preferred. Location Minnesota; salary $1,800 per year. R-1031.

INSTRUMENT MAKER with two years' experience in manufacture of surveyors' transits and levels. The work is at the instrument repair shop, Engineer Depot of the U. S. Army, and comprises the repair and adjustment of transits, levels and various other engineering instruments. Location Washington, D. C.; salary $1,800 per year. R-1032.

DESIGNER of intricate high-speed, automatic machinery and also of tools and fixtures. Man with at least five years' experience of varied character so that he will be able to bring new ideas in methods of manufacture. Should also have had shop experience, be thoroughly practical and capable of designing for economical production. Location Maryland. R-1033.

INSTRUCTOR IN MACHINE-SHOP WORK with at least the equivalent of a high-school training. Must be first class all-round machinist with some knowledge of forging. Photograph, references, and full statement of experience and qualifications must accompany application to receive consideration. Location New Hampshire; salary $1,200-$1,300 per year. R-1034.

DRAFTSMAN AND DETAILER for industrial plant layout work; preferably men with experience in elevating and conveying machinery. Salary $175-$200 per month. R-1039.

SALES ENGINEER who has had some first-hand knowledge of industrial haulage problems, and sales experience, who would be interested in doing sales and sales promotion work in connection with industrial tractors, trailers, cars and locomotives in the Philadelphia territory. R-1041.

JUNIOR ENGINEER; young man educated in mechanical lines, particularly with knowledge of internal-combustion engines to develop into sales engineer, demonstrating and selling piston packing. Loctaion New York City. R-1043.

UNITED STATES FOREST SERVICE is in need of assistant chemists, graduates with degree in chemical engineering or four years of practical experience; technical editor with an engineering training and experience combined together with ability to edit reports and articles; engineers with at le[illegible] years' practical experience for research wo[illegible] engineers with 4 years' practical [illegible] engineering. Location, Madison [illegible] R-1048.

ASSISTANT ENGINEER with [illegible]al tra[illegible] and experience in construc[illegible]n and repairs of industrial plants, qualified to design special machinery and capable of making layouts of new equipment, so as to obtain efficient utilization of floor space and economical plant operation. Prefer man with experience in chemical plant or office of consulting engineer. Location Southern Ohio. R-1053.

COMPETENT MAN to take charge of meat-packing house in British Guiana. No by-products—straight meat production. English only l[illegible]guage necessary. R-1054.

MECHANICAL OR CHEMICAL [illegible] SALESMAN for manuf[illegible] boiler feed-water [illegible] power plants [illegible] representatio[illegible] of the Middle [illegible] and experienced [illegible]055.

[illegible] STUDENT; recent graduate of [illegible] school. Position is with large manu[illegible]turing corportaion. Men enter employ of this concern in capacity of students with the idea of being trained in the work of the company. Men living in Western Massachusetts desired. R-1059.

INSTRUCTOR IN HEAT ENGINES; extensive experience in heat engines, machine designs and engineering drawing. Location New Jersey. R-1062.

EXECUTIVE with executive ability, judge of credits and tact. Position is to succeed vice-president and treasurer (deceased) of a manufacturing concern producing high-class brass goods. Location New York City. R-1067.

SALES ENGINEER; mechanical knowledge desirable, though not absolutely essential. Sales experience preferably in the trailer line. R-1068.

INSTRUCTOR IN MACHINE DESIGN; technical graduate with some practical experience in

this line of work desired, although man with only practical experience will be considered. Location Connecticut; salary $1,250 per school year. R-1069.

DESIGNER AND DRAFTSMAN with good engineering training; somewhat familiar with oil refinery and pumping-station practice. Duties will consist of laying out steel tanks, riveted joints, retorts, stills, etc., and some small structural steel building work. Location New York City; salary about $45 per week. R-1070.

COMPETENT STEAM ENGINEER: must be able to speak Spanish. Headquarters Mexico City. R-1076.

DETAIL DRAFTSMAN; young man with good training and shop experience; preferably one capable of making sketches and details from machined parts of automatic book-binding machinery. Location Westchester County; salary $30 per week. R-1078.

TRACER. Young man with good training and education. Location Westchester County, N. Y.; salary $20 per week. R-1079.

DESIGNERS ON MACHINE TOOLS. Should possess knowledge of either design of hand-screw machines or considerable experience in the operation of such machine. Want men with real aptitude for grasping ideas that will be given to them, and from that to work on the design of a machine of the type specified. R-1084.

DRAFTSMEN to design buildings and installation of machinery. Men with experience in structural steel design preferred. Work will be permanent. Location, Elizabeth, N. J.; salary, $125-150 a month. R-1085.

CENTRIFUGAL-PUMP DESIGNER capable of designing impellers to meet varying conditions for an existing line of pumps. One who has also had experience in testing centrifugal pumps is preferred. Please state age, education, experience, names of last three employers, and salary expected. Location, Middle West. R-1089.

JIG AND FIXTURE DESIGNERS with four or five years' experience. Salary $35 per week of 44 hours. R-1090.

'SMAN experienced with modern foundry and machine-shop ssume responsibility for the engi- ment, including designs, stand- ction of out and standardization of drafting-room ice; to coöperate with shop so that output is designed with view towards quantity production as economically as possible; to design necessary plant equipment. R-1091.

DESIGNING ENGINEER competent in design of high-pressure steam engines of the poppet valve and kindred types. Location, St. Louis. R-1092.

'ATOR AND COST KEEPER with three ars' experience, preferably one with fting, to follow up construc- nd field; compile records material, together with te unit costs for use in Location Niagara Falls, New

TECHNICAL GRADUATE ... neering, about 24 years old, to ... and sell power-plant equipment in the ... States. R-1094.

SALES ENGINEER, who has some chemical knowledge and has acted as assistant or sales manager; 30 to 35 years. Location, New York City. R-1095.

TRACTOR, TOOL AND JIG DESIGNERS AND DRAFTSMEN. Salary from $25 to $50 per week, depending entirely upon the ability of the men employed. Concern manufacturing farm tractors in large quantities, offer positions with excellent chances for advancement to men with ability. Location, Iowa. R-1096.

DRAFTSMEN, experienced in the automobile line preferred, although not essential. Location, Indiana; salary, $125-175 per month. R-1101.

PRODUCER-GAS ENGINEER capable of taking entire charge of producer-gas plant and engine room of 700 h. p. Location, Florida. R-1102.

LARGE MANUFACTURING FIRM in Middle West would like to get in touch with young men who are just finishing University courses in electrical or mechanical engineering, or who left their University courses to enter Army or Navy service and are now looking for employment. Good opportunities will be open for the right men in sales, engineering, design and research work. R-1103.

FIRST-CLASS MARINE-ENGINEERING MEN for drafting department. Location, Staten Island, N. Y. R-1104.

LIVE TRACTOR SALESMAN, especially men with selling experience, although not necessarily tractor-selling experience. Salary and commission in proportion to man's ability. R-1109.

BRANCH MANAGER FOR OFFICE OF CONSULTING ENGINEER in the South West. Must have had extensive experience selling hydraulic machinery and machinery of a similar nature. Must be good engineer, principally well-versed in dealing with mining machinery; must have had Eastern experience. Age 35-45. R-1110.

RAILROAD ENGINEER. Some practical experience with rack-rail work. Position is with contractor who has contract for making survey from San Felipe to Quezaltenango. There will be about 10 miles of a 9 per cent. rack-rail line; the remainder adhesion. Location Quezaltenango, Guatemala. R-1100.

CHECKER AND DRAFTSMAN wanted by large manufacturing plant located in Eastern Pennsylvania. Must have experience along mechanical lines, preferably power plant, coal, ash and ore-handling systems, as well as knowledge of structural steel. State age, nationality, references and salary expected in first letter. R-1123.

ENGINEER-EDITOR for associate's position on leading engineering journal in New York. Broad experience, executive ability and good personality, with ability to meet men prominent in the profession are essential characteristics. R-1130.

EDITORIAL ASSISTANT in office of a mechanical journal. Must have had at least two years' technical education and some experience in handling manuscript and proof. R-1161.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 12th of the month, and the form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

ENGINEERING EXECUTIVE. Stanford University graduate. Ten and one-half years' experience in designing hydraulic, mining and miscellaneous machinery; one year in designing hydroelectric development; four years' in designing, specifying and estimating mechanical equipment of state institutions; one and one-half years' in manufacture of seacoast and railway gun carriages; last six and a half years as engineering department executive. At present employed by U. S. Ordnance Department. Locality preferred, Pacific Coast; age 40; minimum salary, $3,000. A-3421.

TECHNICAL GRADUATE in mechanical engineering, B. S. degree, Worcester Polytechnic ...titute, with three years' experience in shop ...wing room, desires position with ...dvancement. Ensign in Naval ...on inactive duty. ...d or the Eastern S... salary, $2000. A-844.

MECHANICAL ENG... ...ect with corporation in eu... ...ty; eight years' experience in shop, ...om, experimental and process work. ... ical graduate; single. Location near or in New York City. A-944.

CONSULTING ASSISTANT. Columbia mechanical engineer graduate; recently discharged from service desires connection with firm of consulting engineers as assistant, where energy, initiative and common sense are chief requirements. One year's practical experience in central-power stations, some machine-shop and draft-room experience. At present employed as appraiser on power-plant equipment. Prefer location in West or Middle West; age 24; minimum salary, $175 per month. A-1206.

TECHNICAL ASSISTANT TO PRESIDENT with exceptional experience in design and factory management as well as knowledge of salesmanship, advertising and accounting. A-2079.

PRODUCTION ENGINEER OR SUPERINTENDENT. 22 years; specialized practical and executive experience in the manufacture of high-grade interchangeable parts, covering wide range of manufacturing in various executive positions; especially qualified in modern factory methods and designing of equipment to increase production at minimum cost; has had very broad, successful experience in handling help and producing results. New York or Eastern location preferred. A-1737.

MECHANICAL ENGINEER; Naval Officer; age 29; seven years of broad engineering experience and practice. Graduate Columbia University, 1913. Experienced draftsman and test man with manufacturer of turbines and pumps. Was in employ of Municipal Traction Co., for a period of two years. Versatile and easily adaptable; would consider sales or any other promising engineering position. Salary expected, to start, $50 per week. A-1972.

EXECUTIVE with twenty years' exceptional experience and proved capacity now completing well-known successful enterprise of considerable magnitude desires connection as manager of a manufacturing and industrial concern where health, energy, capacity, personality and experience can be utilized. A-2095.

CONVEYING ENGINEER; graduate Cornell 1904, M. E.; 15 years' experience as designing, estimating and sales engineer, covering plant layout and various types of conveyors for every class of material. Production engineer in the Army Ordnance during the war. Release from Army obtainable on one month's notice. A-2752.

WORKS MANAGER OR PRODUCTION MANAGER. Graduate M. E. from Stevens' Institute of Technology; thoroughly versed in scientific management, cost-production methods, planning, scheduling and dispatching; wide experience in manufacturing lines. Would like executive position with well-organized concern. Available at once. A-3248.

EXECUTIVE ENGINEER, member A. S. M. E., A. I. M. E., A. S. C. E., American Society of Ceramic Engineers. Age 35; served as lieutenant-colonel, Engineers in A. E. F. Experienced in railway and highway engineering, industrial management and sales. Limited experience in teaching. Desire permanent employment. Will go anywhere. A-3253.

ASSISTANT SUPERINTENDENT OR CHIEF INSPECTOR; American; age 33; technical mechanical engineering education; twelve years' practical experience in design, manufacture and assembly of interchangeable parts on mass production. Energetic, resourceful, efficient organizer. Can furnish best of references. Desire position in or near Philadelphia. Reasonable salary. A-3266.

MECHANICAL ENGINEER; age 32 years. Ten years' experience in designing, constructing and maintaining plants; also experienced in developing methods to increase production and eliminate waste. At present employed by large shipbuilding concern as plant engineer. Salary desired $4200 per annum. A-3392.

AN ENGINEER, 37 years old, with seven years' teaching experience and twelve years' experience in practice in shop, field and drafting room, in mechanical and structural work, is available for any responsible work in teaching or in practice, in design, construction or operation. A-3394.

MECHANICAL ENGINEER with broad general experience in design and manufacture. A-2079.

COLLEGE AND TECHNICAL GRADUATE with twenty years' practical experience, electrical and mechanical, involving design and construction of light and power distribution, central and sub-station layouts, high and low-tension underground and pole-line transmission, estimation and valuation work desires permanent connection with established firm or industrial plant. Salary dependent on prospects. Best references. A-3395.

MECHANICAL ENGINEER; technical graduate; 5 years' experience including machine design, experimental, mechanical research, sales pro-

motion, inside sales department and some road work. Am ingenious, have inventive ability and a good general knowledge of manufacturing and selling methods. Am at present employed as research engineer with small manufacturing concern. Would prefer foreign position as assistant to office or factory executive. Minimum salary $2100. A-3444.

MANAGER OR SUPERINTENDENT OF WORKS, involving construction; equipment; maintenance; production; development or research. Technically trained in addition to being a practical mechanic (in all the ordinary and special lines). Exceptional ability for planning and working out large enterprises. Twenty years' extensive business experience, in this and other countries, along the following lines: shops, foundrys, mills, industrial and power plants, special and rapid duplicate production, small, medium and heavy work. Working knowledge of Spanish. Live, progressive and practical leader obtaining the best from men and equipment by tact and common sense methods. Dependable habits, strong influential personality. Desire to connect with reputable party in need of exceptional service with corresponding compensation. Released from Ordnance service. A-3449.

MANUFACTURING EXECUTIVE; technical graduate in mechanical engineering; married; five years' experience in shop and office; manufacturing, development and design on steel-plate products, machine tools, power-plant equipment, instruments and electrical apparatus. Desire position as assistant to manufacturing executive or in sales engineering. New York or New England preferred. A-3452.

SUPERINTENDENT OR ASSISTANT SUPERINTENDENT; high-grade, practical and technical man with 15 years' broad experience on cast-brass and iron products; expert on valves, fittings and engineering specialties; thoroughly up-to-date in every phase of engineering, pattern, foundry, tool and production departments; good organizer. Willing to accept position in plant not on paying basis. Excellent record. A-3486.

WATER WORKS ENGINEER with 12 years' experience in erection, maintenance and operation of pumping machinery of all classes; also in plant layout work, tests, etc. Good technical knowledge along these lines. Have been traveling engineer in charge of 30 plants. A-3508.

GRADUATE MECHANICAL ENGINEER; 25 years old; recently released as engineering ensign in Naval service. Three years' engineering and construction work as assistant engineer; one year shop processes and testing on ordnance work. Production, or erection work preferred. A-3546.

FOREIGN TRADE EXPERT; engineer; degree Ch. E.; exofficier of the U. S. Army. Experienced in technical and commercial lines; wish to secure position as assistant export manager in the United States or as a traveling representative in either Latin-America or in Europe. Has business connections in various parts of the world. Now engaged as foreign grade expert in large concern. Excellent knowledge of French; little Spanish. A-3450.

GRADUATE MECHANICAL ENGINEER; six years' experience in shop methods, inspection, designing and executive work. At present an officer in Naval Aviation Service on engineering work; soon to be released. Also have legal education. Desire an engineering position in or near New York City. A-3461.

SALES ENGINEER; fifteen years' experience in general engineering, conveying installations, chemical plants and gas plants as designer and office executive; good organizer; familiar with placing of contracts, conversant in modern languages. Influential business and social connections here and abroad; married, and good personality. Seeks position in sales or other department with progressive concern. Minimum salary $3500. A-3562.

CHIEF OR ASSISTANT ENGINEER; 14 years' practical experience as toolmaker and designer, chief draftsman and assistant to chief engineer. Thoroughly familiar with design of tools and automatic machines for production of articles ranging from heavy machine tools to small typewriter and gun parts. Inventive ability. Age 31 years; married. Eastern location preferred. Minimum salary $240 per month. A-3593.

RESEARCH AND DEVELOPMENT ENGINEER; can develop ideas or inventions to manufacturing base. A-2079.

GRADUATE UNITED STATES NAVAL ACADEMY; honorable resignation from Navy. Several years' civilian executive experience; enrollment for recent service in U. S. Naval Reserve, with promotion to Lieut. Commander, stationed in China. Recently returned to States. Desire to locate in civilian lines. A-3610.

MECHANICAL ENGINEER; 15 years' experience in both branches of engineering; 10 years to date with one firm in the petroleum industry from draftsman to refinery superintendent. At present engaged as superintendent. Desire change. Minimum salary $6000 in the United States. A-3614.

ASSISTANT MANAGER OR SUPERINTENDENT; mechanical engineer; age 31. Specially experienced in machine-shop and foundry work; including metallurgical control of cupola; also experienced in plant layout and operation, erection of machinery, inspection, cost estimating and determination, and production work. At present in charge of foundry and production department. A-3615.

MECHANICAL ENGINEER; long experience in design and construction of excavating machinery. Competive executive. Served as designing engineer, chief draftsman, superintendent and mechanical engineer. Will soon resign from position connected with munition work. A-3616.

RAILWAY EQUIPMENT ENGINEER; age 30; university graduate; with broad experience on plant layout, machine design, locomotive design and construction, rolling-mill design and erection, high-tension electric installation and small power-plant work. Served in A. E. F. as special engineer in facilities and plant layout work throughout France and Belgium. Thoroughly familiar with purchase of mechanical equipment and with business principles. Available immediately. Location preferably Middle West. A-3617.

EXECUTIVE OR SALES ENGINEER, who can leave Navy very soon, desires connection as executive sales manager, or similar responsible position where executive ability, combined with engineering and business experience is essential. Graduate R. P. I. Electrical with mechanical experience five years, experience electrical one year; Lieutenant Navy Reserve in charge of aircraft supplies, excellent references if desired. A-3618.

MECHANICAL ENGINEER; graduate of Cornell 1914, with three years' machine-shop experience, one year as draftsman; one year on foundation work; two years' organization and management experience; and over two years in the U. S. Army, until recently Captain, Corps of Engineers, desires a position along executive lines with a live growing concern. Chief objective is the opportunity to serve under a really big man with prospects for advancement when ability is demonstrated. Location preferably in the East or Middle West. A-3637.

MECHANICAL OR SALES ENGINEER; age 31; married; at present employed. Four years' railroad engineering experience; four years' oil-refinery experience as construction engineer and superintendent; and past four years as engineer and estimator for large concern doing general steel-pipe, structural and tank work. Would like to connect with some good concern needing a sales engineer or an engineering representative to handle the sale, construction and installation of similar products, engineering specialties, machinery or hardware lines. Have my own car and am familiar with California and southwestern territory. A-3655.

SALES ENGINEER to represent substantial concern in Greater New York and northern New Jersey on commission basis and expenses. Graduated M. E. with shop and executive experience; practical, aggressive, persistent knowledge of export trade; speak French, Spanish, German and Russian. Have traveled abroad for English concern. A-3658.

FACTORY MANAGER OR ASSISTANT. Modern methods of production, high-grade product. A-2079.

RESEARCH AND EXPERIMENTAL ENGINEER; degrees of M. S. and M. E. Eight years' experience conducting research and experimental work on various engineering problems. Would consider responsible position with engineering, industrial or public service organization. Present salary, $3200. A-3672.

EXECUTIVE POSITION desired in high-grade manufacturing concern in northeastern part of country. Graduate 1916 Sheffield Scientific School. Experienced in designing, production, accounting, office management, and business methods. At present first lieutenant Ordnance Department, U. S. A. Available about September 1st. A-3684.

ASSISTANT TO PURCHASING AGENT OR TO SALES MANAGER; graduate engineer 1913 B. S., 1917 M. E. Three years' law training; six years' practical experience including commercial testing of material, heat treatment of iron and steel products. Miscellaneous machine-shop practice. Instructor in industrial educational department of large corporation. Engineer of tests and inspector in Army Ordnance Department. Familiar with general trend of market conditions. Philadelphia vicinity preferred. Minimum salary $2400 per annum. A-3687.

MECHANICAL ENGINEER; graduate of Syracuse University; 29 years of age; married. Open for position requiring executive ability, along lines of industrial management work. Past three years in present position as chief engineer and assistant to manager in a plant of 225 employees. Prefer location in New York State. A-3688.

MECHANICAL ENGINEER; graduate M. I. T. Nine years' practical experience, largely as turbo-generator and centrifugal compressor designer. Capable of directing design. At present employed but desire change. Minimum salary $3600 per annum. A-3691.

SUPERINTENDENT OR WORKS MANAGER; technical, commercial education and twenty-two years' practical experience in charge of plant employing over 5000 men. Expert on employing and handling labor and familiar with all cost systems. For past two years major U. S. Army in charge manufacture of artillery ammunition. Age 45 years; minimum salary $7500 to start. A-2993.

INDUSTRIAL PLANT ENGINEER; age 29, single; technical graduate; conscientious; thorough and energetic; ten years experience, including design, construction, installation of mechanical equipment, operation and maintenance of industrial plants, also layouts and estimates. At present employed as assistant chief draftsman; desire position as assistant engineer or chief draftsman. A-1761.

PRODUCTION ENGINEER, age 27; Columbia 1915 M. E.; four years' practical experience in drafting, inspection and production work, including systematizing, routing and scheduling; conversant with bookkeeping and accounting. Desire position in production, sales or other department, or as an assistant to an executive, where such experience combined with executive ability can be used to advantage. Location near New York City preferred. A-1819.

ENGINEER; technical graduate 1914. Experienced in design and construction of power plants in all of their mechanical and electrical details. At present holding executive position in chemical industry which is injurious to health. One year's service in Engineer Corps, U. S. A. Married; age 27; minimum salary $2700. A-3089.

MANAGER OR WORKS ENGINEER; technical graduate. Nine years' designing and estimating; five years' sales engineer and sales manager; six years' plant maintenance and construction. Available about September 1st; salary $6000 per annum. A-3726.

COMBUSTION AND PLANT ENGINEER; six years' experience maintenance of plant including supervision of operation of power plant, also revamping of steam distributing, heating and drying systems to utilize steam to the best advantage. Resourceful in overcoming obstacles; efficient and diplomatic in handling men. Desire position with large industrial plant or chain of plants. Location, Middle West or Ohio preferred. A-3727.

WORKS MANAGER OR ASSISTANT. Graduate mechanical engineer; age 35; desires position as executive. Eight years' experience with Penna. Railroad on special technical investigations, shop installations and management; purchase of machinery, etc. Two years in charge of Chicago office for steel company; one and one-half years with Ordnance Department, U. S. A. in charge of engineering and inspection on contract involving millions, on which claims are nearly settled. Open for engagement about August 1; location immaterial. Salary $4500-$6000. A-3728.

SUPERINTENDENT OR PRODUCTION ENGINEER; twenty years' practical experience as mechanic from apprentice to executive, covering the manufacture of steam, diesel, gas and automobile engines, form tools, form cutters, and general line of small tools and ordnance. Excellent knowledge of organization; planning and routing of materials, rate setting and bonus systems. 37 years of age; married; minimum salary $3500. Eastern location. A-1307.

MECHANICAL AND ELECTRICAL ENGINEER; graduate of M. I. T. in both courses, recently released from active service as Lieutenant in Naval Reserve Force. Available for position requiring engineering and business ability. Married; age 35; eight years' experience consulting engineer; two years' general manager traction company; two years production engineer for large company. Highest references; location, foreign or domestic; salary $5000. A-1562.

FACTORY EXECUTIVE; 15 years' executive experience in large organizations. Has clean and successful record on designs, development, production, standardization, inspection and the handling of help for quantity as well as quality production. Experience covers the manufacture of tools, macnine tools, shoe machinery, interchangeable parts, screw machine products and new devices. Only high-grade connection with progressive concern considered. Eastern location preferred. A-3325.

EXECUTIVE AND WORKS ENGINEER; age 36; married; university graduate; licensed structural engineer. Eight years' experience in design, construction and maintenance of steam-electric power plants; two years works and maintenance engineer; at present employed as maintenance engineer in rubber industry. A-3729.

MECHANICAL ENGINEER with three years' practical experience in engineering and manufacturing work wishes position in manufacturing or sales work, preferably along automobile lines, which offers good opportunities for advancement. Has good general knowledge of manufacturing, and is able to handle correspondence. Previously engaged in manufacture of ball bearings. Technical graduate; age 25; unmarried. A-3730.

MECHANICAL ENGINEER; graduate Swiss Technical School with over twelve years' practical experience in this country as draftsman, erecting engineer, maintenance engineer and factory manager. For the past six years employed in an executive capacity by a progressive rubber company. Desirous of making a new connection either here or in foreign service. A-3731.

MECHANICAL ENGINEER recently released from army. Eight years' experience in design and supervision of factory and power plant construction and equipment. Age 32; Cornell graduate. A-2853.

SALES ENGINEER OR ASSISTANT TO AN EXECUTIVE; technical graduate; age 25, with 4 years' experience in building construction and installation of mechanical equipment. Recently released from government service; desire to locate in New York district. Would consider moderate salary to start in position with a future. A-1581.

EXECUTIVE ENGINEER as assistant to president or general manager of manufacturing concern desirous of introducing new methods for improving product. Can make complete mechanical report from personal observation of conditions requiring betterment. Twenty-five years of experience designing automatic machinery and as production superintendent in large factory requiring accuracy in its product. Specialty; introducing new methods to eliminate waste and produce work for assembling by unskilled labor. Recently released from war contract work. Inventor; long experience in designing jigs, fixtures and gauges. Personal interview desired. Salary $5000. A-3762.

MEMBER with 14 years' experience including patent-office routine, machine designing, experimental engineering, factory systematizing and superintendence in automatic industrial machinery, seeks change to broader field without the limitations of usual factory routine. A-3756.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER AUGUST 19

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 152.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by August 19, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS.

GABRIEL, JOSEPH A., Special Draftsman, Tennessee Coal, Iron & Railroad Company, Birmingham

Arkansas

GILDWICK, JOHN W., Vice-President, Athletic Mining & Smelting Company, Fort Smith
CROSBY, CHARLES J., Owner Crosby Machine Works, Jonesboro.

California

[illegible]ERT E., Associate Professor, Throop [illegible]nology, Pasadena
Sales Engineer and [illegible]n Company, Inc., [illegible] Francisco
HUTTON, G[illegible] [illegible]Marys-ville Dredging Co[illegible]
KLAUBER, LAURENCE M., [illegible] Superintendent, San Diego Consolidated Gas & Electric Company. San Diego
SAVAGE, ARTHUR J., General Superintende[illegible] A. J. Savage Munitions Company, San Diego

Colorado

VAN LAW, DURBIN, Denver

Connecticut

CRAWFORD, EMERICK B., Engineering Salesman, Oven Equipment & Mfg. Company, New Haven
DELSOLE, JOSEPH H., Foreman of Model and Gauge Shop, Winchester Company, New Haven
HITT, FRED A., Foreman, Pratt & Cady Company, Inc., Hartford
MARCY, LYLE B., Superintendent, Hart & Cooley Company, Inc., New Britain
PERRY, CLARENCE C., Editor, "The Locomotive," The Hartford Steam Boiler Inspection and Insurance Company, Hartford
WOLF, FREDERICK K., Assistant Tool Inspection Supervisor, Winchester Repeating Arms Company, Winchester

Delaware

CHIAVERIN, FRANCIS, Designer, Hercules Powder Company, Wilmington

District of Columbia

GIRYOTAS, WALTER J., Engineer Accountant, United States Railroad Administration, Washington
HANSON, MILTON E. Research Mechanical Engineer, American University Experiment Station, Washington.
WHITTET, ARTHUR R., Skilled Draftsman, Technical Staff, Ordnance Office, Washington

Illinois

ALLING, CLAUDE R., Engineer, Casualty Department, Underwriters' Laboratories, (Re-elections). Chicago
ASSELL, WALTER J., Squad Leader, Engineering Department, Illinois Steel Company, Chicago
[illegible] L., Lubricating Engineer, The Chicago [illegible]tion Superintendent, [illegible]ny, Chicago.
MOHN, FINN, C[illegible] tion, Western Elect[illegible]
ROBINSON, THOMAS J., Genera[illegible] Robinson Engineering Company, C[illegible]
WILLARD, ARTHUR C., Professor, University of Illinois, Urbana

Indiana

CARL, MAURICE R., Mechanical Engineer, Diamond Chain Mfg. Company, Indianapolis

Iowa

ALLEN, RAYMOND H., Student, State University of Iowa, Elkader

Kentucky

GREGORY, WILLIAM K., Conveyor Engineer, Dow Wire & Iron Works, Louisville

Louisiana

KNIPPING, RAINER H., Engineer, A. M. Lockett & Company New Orleans

Maryland

BITTER, KENNETH O., Engineer, F. N. Hooper Company, Inc., Glenarm
KRILL, GEORGE, Foreman of Erection, Bethlehem Ship Corporation. Sparrows Point
MALLOY, WILLIAM E., Lieut. U. S. N., Annapolis

Massachusetts

BLACK, GEORGE, Mechanical Superintendent, Berkshire Cotton Company, Adams
GARDNER, DWIGHT R., Gage Designer, Greenfield Tap & Die Corporation. Greenfield
LANNON, JAMES J., Treasurer & Manager, Grant Gear Works, Boston
MANTER, ELWOOD M., Engineering Draftsman, Perry & Whipple, New Bedford
MANUELIAN, HAMAZZSB D., Assistant to Works Engineer, U. S. Cartridge Company, Lowell
PROCTOR, GEORGE A., Mechanical Engineer, Grant Gear Works, Inc., Boston
RYAN, FRANCIS M., Efficiency Engineer, Norton Company, Worcester
[illegible]RNS, WALTER I., Industrial Engineer, [illegible]ley & Marvin Company, Boston
[illegible]LAMSON, DANIEL W., Mechanical Superintendent Farr Alpaca Company, Holyoke

Michigan

BLAUVELT, WARREN S., Consulting Engineer, Detroit
BROWN, CONFORT E., Captain, Ordnance Department, U. S. A., Charge of Shell Ammunition at Detroit District, Detroit
FERRIS, DONALD M., Harbor Beach
GREEN, HEATLEY, President, Automatic Products Company, Detroit
HAMILTON, JAMES C., Chassis Designer, Oakland Motor Car Company, Pontiac
PERRY, WALTER B., Factory Superintendent, Industrial Works, Bay City

PETIT, WILLIAM H., Partner, DeKam & Petit, Detroit
SPALDING, JOHN D., Chief Draftsman, Smalley-General Company, Bay City

Missouri

GROTE, HENRY C., Assistant Chief Engineer, Monsanto Chemical Works, St. Louis
WAGNER, HUGH K., Patent Lawyer, St. Louis

Nebraska

BUNTING, ALBERT, Assistant Professor of Practical Mechanics, University of Nebraska, Lincoln

New Jersey

AMOS, ALEXANDER R., J., Ensign, U. S. N. R. F., Hoboken
HOLLANDER, ALADAR, Chief Engineer, Lea-Courtenay Company, Newark
JOHN, FREDERICK W., Corn Products Refining Company, Edgewater
KOLBERT, ALEXANDER W., Assistant General Manager and Sales Manager, Hart Roller Bearing, Orange
KREBS, GEORGE J., Assistant Engineer, American Sugar Refining Company, Jersey City
NICHOLAS, ANDREW J., Testing Department, Ingersoll Rand Company, Phillipsburg
SHONNARD, HAROLD W., Consulting Engineer, Crucible Steel Company of America, Upper Montclair
STIRES, WILLIAM H., Chief Estimating Engineer, Taylor-Wharton I. & S. Company, High Bridge
WHITE, GEORGE C., General Superintendent, Beaver Machine & Tool Company, Inc., Newark
WILLIAMS, ALBERT H., Works Manager, Hart Roller Bearing Company, Orange

New York

BROMLEY, CHARLES H., Associate Editor, "Power," New York
BULL, FREDERICK C., Major, Chief of Section, Artillery Ammunition & Trench Warfare, New York District, New York
BURNELL, EUGENE, Works Manager, Atlantic Loading Company, New York
CARLOTH, JOSEPH J., Chief Draftsman, J. F. Musselman, Consulting Engineer, New York
CATHER, JAY *H.*, Charge of Power, Eastman Kodak Company, Rochester
DOUGHERTY, PATRICK J., Designing Engineer, International Heater Company, Utica
DWYER, LEON W., Head of Tool and Gauge Inspection, Watervliet Arsenal, Watervliet
EIBSEN, LOUIS J., Engineer, The Foundation Company, New York
FREW, GEORGE H., Jr., Assistant to Manager, Asiatic Machinery Sales Department, W. R. Grace & Company, New York
FRIEND, WILLIAM H., Chief Engineer, Mashek Engineering Company, New York
GARDNER, ROBERT S., Industrial Engineer, New York
GARVEY, WRIGHT B., Estimator, Watervliet Arsenal, Watervliet
GERARD, MAURICE G., Industrial Engineer, Gerard-Graham & Company, New York
GOYNE, WILLIAM J., Specifications and Design of Locomotives, American Locomotive Company, New York
LANDI, ARCHILLE A., New York
LE BLANC, ALEXIS, Appraisal Expert, Aircraft Production Board, New York
McCARTHY, THOMAS E. M., New York University, New York
MENZIES, JOHN C., Sales Correspondent, Hyatt Roller Bearing Company, New York
NICOL, NORMAN C., Metallurgical Department, National Tube Company, New York
PERRY, CHARLES T., Mechanical Engineer, Dept. Plants & Structures, City of New York, New York
SPADE, WILLIAM P., Assistant Superintendent, Tool Dept., Watervliet Arsenal, Watervliet
THOMAS, WILLIAM A., 3rd, Sales Engineer, Wilson Welder & Metal Company, Inc., New York
WARD, GEORGE A., Designing Engineer, Wilputte Coke Oven Corporation, New York
WEBSTER, EDWARD S., Assistant Foreman, Watervliet Arsenal, Watervliet
WOOLLEY, REW E., Engineering and Sales Work, General Electric Company, Schenectady
ZEUNER, CHARLES F., New York

Ohio

CARNEY, THOMAS, Designer, Willys-Overland Company, Toledo
GREGORY, GUY, Manager, Cleveland Pneumatic Tool Company, Cleveland
HOWETT, JOHN M., Sales Engineer, Hannifin Manufacturing Company, Dayton
KEENER, GLENN G., Designing Engineer, The McMyler Interstate Company, Bedford
LINDMUELLER, EDWARD, Consulting Mechanical Engineer, Cleveland
MENCKE, JOHN W. H., Sales Engineering Staff, Goodyear Tire & Rubber Company, Akron
NEMEC, CHARLES J., Mold Designer, Aluminum Castings Company, Cleveland
REEVES, THOMAS W., Superintendent, McNaull Boiler Manufacturing Company, Toledo
ROLF, HERMAN L., President & Manager, The Rolf Heater Manufacturing Company, Columbus
TAPPENDEN, RICHARD L., Vice-President, Horsburgh Forge Company, Cleveland

Oklahoma

KIRBY, WILLIAM K., Chief Draftsman, Empire Gas & Fuel Company, Bartlesville

Pennsylvania

BENEDICT, LOYAL C., Rate Foreman, Western Electric & Manufacturing Company, E. Pittsburgh
DESSEN, EINAR, Sales Engineer, Malin Engineering Company, Philadelphia
DODGE, KARL, 1st Lieutenant, Ordnance, U. S. Army, Philadelphia
FISHER, CHARLES E., Chief Engineer, Titusville Iron Works Company, Titusville
FREY, WILLIAM P., Fuel Engineer, Lehigh Coal & Navigation Company, Lansford
GRONTOFT, ARNLIOT F. C., District Statistician, U. S. Shipping Board, Emergency Fleet Corporation, Philadelphia
HALLOCK, JOHN W. W., Director of Co-operative Work, University of Pittsburgh, Pittsburgh
HESSDOERFER, GEORGE M., Jr., Eastern Sales Engineer, Abell-Howell Company, Philadelphia
HESSELINK, LAWRENCE R., Assistant Chief Draftsman, Standard Engineering Company, Elwood City
HITCHEN, MAURICE, Purchasing Agent, Emergency Fleet Corporation, Philadelphia
LLOYD, LINUEL P., Cadet Engineer, United States Shipping Board, Philadelphia
LUND, JOHN, Division Superintendent, Bethlehem Steel Company, Bethlehem
MARTIN, EVAN S., Manager, Cummings Structural Concrete Company, Philadelphia
MAYNARD, ALMY C., Mechanical Engineer, Eagan Rogers Steel & Iron Company, Crumm Lynne
REPA, MICHAEL, Wilkes-Barre
VEENSCHOTEN, VINCENT V., Northern Equipment Company, Erie

Texas

ANDERSON, REXFORD O., Mechanical Engineer, International Marine Iron Works, Houston
DEWEY, MAURICE J., Assistant Mechanical Engineer, The Texas Company, Houston

Virginia

DRAKE, RALPH L., Maintenance Egineer, American Locomotive Company, Richmond
LUDWICK, WILLIAM A., Lubrication Engineer, The Texas Company, Norfolk
STEVENS, FREDERIC R., Chief Engineer, Alco Plant, American Locomotive Company, Richmond

West Virginia

CHAPMAN, ARTHUR W., Consulting Engineer, West Virginia Pulp & Paper Company, Piedmont

Wisconsin

DODGE, ADIEL Y., Assistant Plant & Tool Engineer, Wallis Tractor Company, Racine
LEWIS, CHARLES M., Mechanical Engineer, Badger Malleable & Mfg. Company, South Milwaukee

Canada

ADAMS, ERWIN A., Advertising Manager, Canadian Fairbanks Morse Company, Ltd., Montreal

Cuba

DALLAS, CHARLES F., Engineer, Honolulu Iron Works Company, Havana
ESTRADO, LUIS F., Specializing in Insurance, Havana

England

CAMERON, ARCHIBALD P., Engineer, Messrs. Worthington-Simpson, Ltd., London
SOUTHERN, HERBERT, Senior Draftsman, Messrs. Steel Peech & Tozer, Ltd., Sheffield

France

DeMEEUS, PIERRE, Technical Agent of Societe Metallurgique de Montbard Aulnoye, Paris
NUGUE, PIERRE, Administrateur, Societe des Etablissements Ct. Pinette, Chalon-Sur-Saone
PERREAUD, VICTOR P., Member, French Mission of Reconstruction in U. S. A., Paris

India

SRINIVASAIYENGAR, K., Loco Superintendent, Mysore State Railways, Bangalore

Japan

CUMMINS, LEON V., Metallurgist and Testing Engineer, Yokohoma

CHANGE OF GRADING
PROMOTION FROM ASSOCIATE

Indiana

WRIGHT, DONALD C., Production Manager, Dodge Mfg. Company, Mishawaka

Maryland

MITCHELL, GUY K., President, Standard Electric & Elevator Company, Inc., Baltimore

New Jersey

MATHEY, HENRY C., Manager, Okonite Company, Passaic

New York

SAMPSON, GEORGE T., Mechanical Engineer, American Can Company, New York
YODER, THOMAS M., Assistant District Sales Agent, Erie City Iron Works, New York

PROMOTION FROM ASSOCIATE MEMBER

California

CLARK, HAROLD H., Manager, Link-Belt Company, Los Angeles

Illinois

AVERY, A. ORDELL, Chief of Layout & Investigation Department, Western Electric Company, Inc., Chicago
THOMA, WALTER, Chief Inspector, E. W. Bliss Company, Brooklyn

PROMOTION FROM JUNIOR

Connecticut

GAYLORD, WILLIAM W., Chief Draftsman, The American Brass Company, Torrington

Illinois

ALSBERG, JULIUS, Consulting Engineer, Chicago

Michigan

FOX, RUDOLPH H., Sales Engineer, Gurney Ball Bearing, Detroit
HAYNES, HASBROUCK, President, Hasbrouck Haynes & Company, Chicago

New York

REESE, DALE F., Superintendent, Engineering Department, Ocean Accident & Guarantee Corporation, Ltd., New York
TAG, WALTER, Knickerbocker Ice Company, New York
VEHSLAGE, HAROLD E., Consulting Mechanical Engineer and Merchant, H. J. Baker & Bro., New York

Ohio

LYDECKER, KENNETH, Division Manager, The White Company, Cleveland
STERLING, C. H., Chief Engineer, Kelly-Springfield Motor Truck Company, Springfield

Cuba

STANCLIFF, ARTHUR D., Superintendent, Cuban Portland Cement Company, Mariel

SUMMARY

New Applications	134
Applications for change of grading	
Promotion from Associate	5
Promotion from Associate-Member	3
Promotion from Junior	10
Total	152

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Volume 41 Number 9

MECHANICAL ENGINEERING

THE JOURNAL OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

September, 1919

Society Affairs

A Record of the Current Activities of the Society, Its Members, Council, Committees, Sections and Student Branches; and Affairs of Interest to the Membership

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
29 West 39th Street, New York

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

ABRIDGED LIST OF OFFICERS AND COMMITTEES

OFFICERS AND COUNCIL, 1919

President

M. E. Cooley

Past-Presidents

Members of the Council for 1919

James Hartness
John A. Brashear
D. S. Jacobus
Ira N. Hollis
Charles T. Main

Vice-Presidents

Terms expire December, 1919

John Hunter
Spencer Miller
Max Toltz

Terms expire December, 1920

Fred R. Low
Henry B. Sargent
John A. Stevens

Managers

Terms expire December, 1919

Robert H. Fernald
William B. Gregory
C. R. Weymouth

Terms expire December, 1920

Fred N. Bushnell
Fred A. Geier
D. Robert Yarnall

Terms expire December, 1921

Charles L. Newcomb
Charles Russ Richards
Frank O. Wells

Chairmen of Standing Committees of Administration

Treasurer

William H. Wiley

Secretary

Calvin W. Rice

Executive Committee of the Council

Mortimer E. Cooley, *Chairman*
Ira N. Hollis
John Hunter
D. S. Jacobus
Charles T. Main
Henry B. Sargent

COMMITTEES, ETC.

STANDING COMMITTEES OF ADMINISTRATION

Chairmen

Finance, W. E. Symons
Meetings and Program, D. S. Kimball
Publications and Papers, George A. Orrok
Membership, S. D. Collett
Sections, D. Robert Yarnall
Constitution and By-Laws, I. H. Woolson, Ac.Ch.

STANDING COMMITTEES

Chairmen

House, Orrie P. Cummings
Library, ———
Public Relations, F. H. Newell
Research, Arthur M. Greene, Jr.
Standardization, Henry Hess

SOCIETY REPRESENTATION

American Association for Advancement of Science
American Engineering Standards Committee
Classification of Technical Literature
Cost of Electric Power
Engineering Council
Engineering Foundation Board
Expert Testimony Committee
International Corresponding Committee on Screw Threads
International Standard for Pipe Threads
John Fritz Medal Board of Award
Joseph A. Holmes Memorial Board
National Industrial Conference Board
National Research Council
Naval Consulting Board of the United States
Standardization of Pipe and Pipe Fittings for Fire Protection
Standards for Graphic Presentation
United Engineering Society, Board of Trustees
United Engineering Society, Library Board
United States Bureau of Mines, Advisory Committee
Western Society of Engineers, Washington Award

SPECIAL COMMITTEES

Chairmen

Aims and Organization, L. C. Marburg
Increase of Membership, S. D. Collett
Industrial Relations, A. W. Burchard
Memorial to Dr. Hutton, Jesse M. Smith
Rehabilitation of Blind, C. H. Benjamin
Relations With Colleges, I. N. Hollis
War Industries Readjustment, G. K. Parsons
Code of Ethics, ———
Classification of Technical Literature, ———
War Participation and Members Memorial, F. J. Miller

COMMITTEES ON ENGINEERING SUBJECTS

Chairmen

Boiler Code, John A. Stevens
Power Test Code, Fred R. Low
Feed Water Standardization, Geo. F. Gebhardt
Protection of Industrial Workers, John W. Upp
Machine Tool Standardization, A. DeLeeuw
Revision of Briggs Standard, E. M. Herr
Standardization of Shafting, C. M. Chapman
Steel Roller Chains, C. H. Benjamin
Technical Nomenclature, W. D. Ennis
Weights and Measures, L. D. Burlingame

SPECIAL TECHNICAL (SCREW THREAD COMMITTEES)

Chairmen

Screw Threads and Threaded Parts, E. M. Herr
Flanges and Pipe Fittings, A. R. Baylis
Machine Screw Nuts, E. H. Ehrman
Tolerances in Screw Thread Fits, L. D. Burlingame

ANNUAL COMMITTEES

Regular Nominating Committee, Hinchman
Tellers of Election, J. H. Lawrence

SOCIETY AFFAIRS

Affairs of Interest to the Membership — Secretary's Letter — Council and Executive Committee — James Watt Centenary — Employment Bulletin — Candidates for Membership

The Secretary's Letter

IN another column there will be found an account of some of my relations with Mr. Carnegie in connection with his gift for the buildings for the Engineering Societies and the Engineers' Club; but there are two further incidents which I have reserved for inclusion in my letter.

When Mr. Carnegie had assented to the gift, originally $1,000,000, he went to his writing desk and taking one of the engraved letterheads commenced to write out the confirmation. After a few lines his pen caught the paper and made a blot. Instead of taking a new sheet, as most people would do, he carefully folded the spoiled sheet, tore it in two and wrote out his gift of one million dollars on the lower half. This illustrates his ability to save and conserve, which, consistently followed, was undoubtedly one of the secrets of his success.

The following incident is creditable to the engineers in question and should serve as an encouragement to all who try and then fail.

After Mr. Carnegie's gift of $7,000 for abstracting and cataloging the Sir Latimer Clark Collection, which had been presented to the Institute by Dr. Schuyler Skaats Wheeler, Mem.Am.Soc.M.E., the Institute sought to give a dinner in honor of Mr. Carnegie, but he declined. Mr. T. C. Martin, past-president of the Institute, was the spokesman and persisted in his invitation and, if I remember correctly, was refused seven times. Finally Mr. Carnegie yielded, with the result stated elsewhere in the account of his career.

CALVIN W. RICE,
Secretary.

Council and Executive Committee

THE first meeting of the Council for the new season 1919-20 will be held on Friday, September 19, in New York City.

Since the Council adjourned for its summer recess so many matters of first importance have come up that the President has called two meetings of the Executive Committee. The minutes of these meetings are abstracted below. According to the Constitution the acts of the Executive Committee are later reported to the Council.

EXECUTIVE COMMITTEE MEETINGS

The first meeting was held in the rooms of the Society on Monday, July 14. There were present: *President* Mortimer E. Cooley, presiding; Ira N. Hollis, John Hunter, D. S. Jacobus, Charles T. Main, Henry B. Sargent, and by invitation Major Fred J. Miller, representing the Publication Committee, and Prof. Comfort A. Adams, Chairman of the American Engineering Standards Committee, and Calvin W. Rice, *Secretary.*

Aims and Organization Committee. The Chairman of this Committee was requested to present its revised report to the Council not later than its November meeting, so that the report could be printed and distributed to the members previous to the Annual Meeting.

Special Committee on Awards. Papers received by the Society for competition for the Junior and Student prizes for 1919 were referred to the Special Committee on Awards, of which Past-President Hollis is Chairman.

Local Sections Committee. A formal petition from the members of the Society in the territory adjacent to Houston, Tex., for a Local Section including all Texas south of the line running east and west through Fort Worth, was approved, and A. B. Steen, Chairman, O. N. Edgar, Secretary, H. C. Smith, H. Hildenbrand, and A. T. Vick were recorded as the first Executive Committee of the Section.

The second meeting of the Committee was held on July 24, also in the rooms of the Society. There were present: *President* M. E. Cooley, presiding; Ira N. Hollis, D. S. Jacobus, Henry B. Sargent, John Hunter, and Calvin W. Rice, *Secretary;* and by invitation George J. Foran and Charles Whiting Baker, representatives of the Society on Engineering Council with Messrs. Cooley, Hunter and Jacobus.

Death of Past-President Wellman. Notice of the death of Past-President S. T. Wellman was received with regret. An account of the life and attainments of Mr. Wellman and his connection with the Society is published in the August issue of MECHANICAL ENGINEERING.

War Industries Readjustment Committee. This Committee presented an excellent report of the work performed by it in designing a method for appraising the machine tools owned throughout the United States by the Government, which was received with appreciation.

House Committee. This Committee reported alterations and renovations in the rooms of the Society, which are now proceeding.

James Watt Centenary. The President reported the appointment of Mr. W. E. Symons and Mr. R. Sanford Riley as Honorary Vice-Presidents to represent the Society at the James Watt Centenary Commemoration to be held in Birmingham, England, September 16 to 18.

Special Committees. It was voted to recommend to the Council that provision be made for the discharging of special committees at the expiration of each President and statutory Council, and for the incoming President and Council to appoint any special committees required.

CALVIN W. RICE,
Secretary.

James Watt Centenary

Following up the preliminary notice concerning the James Watt Centenary made on page 690 of the August issue, the announcement is now made that the commemoration will be held in Birmingham, England, on September 16 to 18. Mr. W. E. Symons and Mr. R. Sanford Riley will both represent the Society at the exercises, which are expected to provide a gathering of engineers such as the world has never before seen. On the second day visits will be made to two Watt engines near Birmingham, and to some of the shop buildings erected by Boulton and Watt which still remain.

It is intended that an International Permanent Memorial should be founded in Birmingham, where James Watt spent the greater part of his life and built all his engines, so that the city should be to engineers what Stratford-on-Avon is to lovers of Shakespeare.

The International Memorial is proposed to take the following form:

1 Endowment of a professorship of engineering to be known as the James Watt Chair at the University of Birmingham for the promotion of research in the fundamental principles underlying the production of power, and the study of the conservation of the natural sources of energy.

2 To erect a James Watt Memorial Building to serve as a museum, meeting place and library, and a center from which engineers may coöperate in spreading scientific knowledge.

3 To publish a memorial volume.

An illustrated booklet containing a eulogy of James Watt by Professor Burstall is being distributed directly from the James Watt Centenary Committee to our membership.

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications and positions listed below combine the services of the Society and of the Engineering Societies Employment Bureau, Room 1605, Engineering Societies Building.

POSITIONS AVAILABLE

Stamps should be inclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society records.

INSTRUCTOR IN MECHANICAL ENGINEERING; technical graduate with both teaching and practical experience. Salary $1500 to $2000 per year. Location District of Columbia. R-919.

GENERAL EFFICIENCY ENGINEER; experience in connection with electric light, waterworks and ice-manufacturing plants. Must understand plant operation of public utility properties and have had experience with absorption ice machines; must have personality and tact to deal with the public. Traveling position. R-1125.

REFRIGERATING ENGINEER; young and energetic engineer, experienced both theoretically and practically in ice-making and refrigerating machinery, for position in Estimating and Sales Dept. of large manufacturing company. Location Wisconsin. R-1128.

POWER-PLANT SUPERINTENDENT; extensive experience in power-plant work. Technical graduate preferred. Must have had experience in running tests and operating plants. Duties will be to have entire charge of engine and boiler-room work, and also of electrical work throughout plant. Location New Jersey. R-1131.

CHIEF ENGINEER; technical education and some experience in power-plant work. Must be in vigorous health, with good habits and a willing worker. Should have, or should be able to obtain a first-class engineer's license in Mass. Duties will be to have charge of boilers, engines and electrical generation in manufacturing plant. Location Mass. Salary $35 to $40 per week. R-1132.

REFRIGERATING ENGINEER; actual experience in operation of refrigerating machinery and knowledge of power-plant construction and engineering. Young man about 30 years of age desired. Location New York City, with some traveling. R-1133.

DRAFTSMAN; familiarity with Diesel engine design. Location New York State. Openings for two or three men. R-1134.

CHIEF DRAFTSMAN; ability to develop drafting-room personnel, to systematize the arrangement and filing of necessary engineering data, and to coöperate in practical manner with shop. Location Illinois. R-1135.

INSTRUCTOR IN CIVIL ENGINEERING; Lafayette College, Easton, Pa. Work chiefly in surveying and mechanics. Salary for nine months $1200 to $1400, depending upon qualifications. Apply by letter enclosing an outline of experience and giving references. R-1136.

INSTRUCTOR IN MACHINE SHOP; technical graduate with some practical shop experience. Salary $1800 per year. Location Michigan. R-1138.

CHIEF ENGINEER AND HEAD DRAFTSMAN; experience in this line of work for position with large heating and piping contractors' company. Location New York. R-1139.

SALES REPRESENTATIVE; Western man; preferably one from vicinity of Chicago with acquaintances among railroad men. Experience in railroad line necessary, but not necessary that applicant shall have had previous sales experience. Must have personality and initiative. Position is with manufacturing company making locomotive injectors, etc., Salary $200 to $250 per month, plus expenses. Location Illinois. Apply by letter in own handwriting. R-1140.

MECHANICAL ENGINEER; considerable experience in power and industrial plants, central station and municipal work. Rather mature man desired. Duties will consist of office and road work. Road work will be getting in touch with big manufacturers, and will involve no selling. Position is editorial in its nature. Location New York City. R-1142.

PLANT ENGINEER; single man with experience as plant engineer. The position is with a nitrate plant that employs 2,000 men and has a very large electric power plant, boiler plant, leaching plant, conveyors and elevators, crushers, machine shops, railroads and water system. Applicant would have charge of the maintenance and new developments, hence he must be a man of some experience, but not necessarily technical graduate. Man with knowledge of Spanish will be given preference. Salary $200 to $250 per month, with board and lodging. Location Chile, S. A. R-1145.

MACHINE DESIGNER; high-class knowledge of mechanical engineering, with special experience in ammonia refrigeration. Duties consist in taking the general outline of refrigeration system and in working up the design and appearance of machines, and also the practicability of whole proposition. Location Oklahoma. R-1148.

MASTER MECHANIC; some technical training and wide experience in repairs and maintenance of boilers, engines, pumps, electrical equipment, millwright work, handling equipment and all such work as is ordinarily found in large industrial plant. Only thoroughly competent man, experienced and tactful in handling labor, need apply. Location vicinity of New York City. R-1150.

ENGINEERING DRAFTSMAN; young engineer, preferably technical graduate with some industrial experience. Work will cover designing of machinery, buildings, etc., and laying out of transmission lines, equipment, and other work in connection with manufacturing plant. Location Massachusetts. R-1151.

MACHINE-TOOL SALESMAN; experienced in this line of work. Location New York City. R-1152.

TRANSITMAN; experience in this line of work. Location Quezaltenango, Quatemalo. R-1153.

INSTRUCTOR IN MECHANICS; young graduate engineer. Man with some teaching experience desired. Duties consist of teaching mechanics and assisting in the laboratory for testing materials. Location Pennsylvania. R-1155.

IRON-FOUNDRY SUPERINTENDENT; experience in this line of work. R-1163.

ENGINEER EXECUTIVE; must have had outside building experience in connection with mill work, complete power plants, industrial plants, etc. Position is an office one in charge of construction department of large contracting company. Location New York City. R-1166.

DRAFTSMAN AND DESIGNER; experience in power-plant work, both electrical and steam; also in sanitation work. Delaware man preferred. Salary $40 to $50 per week. Location Delaware. R-1171.

MACHINE DESIGNER; experienced on medium-sized automatic machinery for metal cutting. Salary $200 per month. Location New York City. R-1176.

FOREMAN FOR HEAVY-TOOL DEPARTMENT; experience in heavy machine tool work. Position is with company manufacturing gas engines exclusively, ranging from 20 to 75 h.p. The department over which this man will preside machines all the heavier parts of the engines. General practical man about 40 years old, whose experience has been mostly in machinery, desired. Middle-west man preferred. Location Ohio. R-1182.

GAS AND OIL ENGINE DESIGNER; must be A-1 designer experienced in internal-combustion engines. Position is with manufacturing company producing such engines on large scale. Location Middle West. R-1184.

CHIEF MACHINE-TOOL DESIGNER; must have executive ability and wide experience in design, manufacture, and use of machine tools. Only high-grade men wanted. A company manufacturing large machine tools, now making plans for extensive additions to line, desires to fill this position. Location New York City. R-1185.

EVAPORATION ENGINEER; experience with double effect vacuum pans. Must be fully capable. Position is with large salt-manufacturing company. Salary $2000 per year with bonus. Location Canada. R-1186.

INSTRUCTOR IN MECHANICAL ENGINEERING; must be technical graduate with some experience either in teaching or practice. Duties will include mechanical drafting, mechanism, machine design and mechanical laboratory. Salary $1400 for ten months' service. Location Idaho. R-1187.

SALES ENGINEER; familiarity with lubricating refinery products and the jobbing trade. Duties of position are those of manager of sales department. Location New York City. R-1192.

SUPERINTENDENT; must have extensive experience in the manufacture of precision tools. Only men with this experience will be considered. Position is with concern employing over 500 men and having growing business. Location outside of New York. R-1195.

PUMP DESIGNER; experience in design of pumps of various character. Location Illinois. R-1198.

ERECTING ENGINEER; experience in installation and operation of oil-refinery apparatus. Practical man with extensive experience in, and knowledge of, machines and how to operate them. Location New York City. R-1199.

PROFESSOR OF ELECTRICAL ENGINEERING; four or five years' experience. Some knowledge of steam-turbine testing and experience in teaching direct-current subjects including laboratory, electric railways, electrical design and mechanical laboratory. Teaching will not exceed 24 actual hours per week. $680 in Mexican money is allowed for transportation each way, which is more than ample for one, and will almost pay transportation for two in the case of a married man; residence furnished married man; bachelor given quarters in bachelors' mess. Three-year contract, renewable at end of period, if mutually satisfactory. Salary, Mex. $4000 to Mex. $4700 per year, equivalent in U. S. money to $3600 to $4200 per year. Living expenses should be considerably less than above figures. Location China. R-1202.

INSTRUCTOR OR ASSISTANT PROFESSOR; experience in thermodynamics and steam and gas laboratory work. Position is in steam and gas department of large educational institution. Salary $1600 to $2200 per year. Location Middle West. R-1205.

MECHANICAL ENGINEER; experience in manufacture of ammonia. Location New York City. R-1209.

DESIGNING ENGINEER; best possible experience in cane-sugar-mill design, both theoretical and practical. Location New York City. R-1210.

ENGINEERING DESIGNER; experience in oil refinery or similar construction work. Openings for several men. Location Philadelphia, Pa. R-1211.

POWER-PLANT DESIGNER; experience and training in electric-generating power plants. Must be able to draft complete layouts of both mechanical and electrical details of such plants. Young graduate engineer desired. Send photograph with letter of application. Salary $165 per month. Location in Tennessee. R-1212.

MACHINERY DESIGNER; technical graduate experienced in designing and detailing machinery. Must be good, rapid, accurate mechanical draftsman. Send photograph with letter of application. Salary $165 per month. Location Tennessee. R-1213.

ACCOUNTANT; training as an accountant and experience in large manufacturing concern. Must be capable of taking charge of factory accounting in broad and cooperative spirit with factory manager. Position is with concern employing about 700 men. Location outside of New York. R-1221.

DESIGNING ENGINEER; extensive experience in design of steam-power plants. Must be man of highest grade. At least 32 years of age and must have had actual field experience. Duties of position will be to design complete steam-power plants. Location Boston, Mass. R-1222.

HYDRAULIC DRAFTSMAN; experience in design of hydro-electric stations. Location New York City. R-1223.

SALESMAN; experience in selling belting. Man conversant with conveyor requirements especially desired. Location is in Pennsylvania. R-1224.

ASSOCIATE EDITOR; must be mechanical engineer with experience in equipment, and processes of sugar industry. Must have some experience in writing either for magazines or books, and must know Spanish thoroughly. Location Eastern City. R-1231.

STRUCTURAL DRAFTSMAN; must be technical graduate and know how to analyze forces in concrete and steel structures; how to design such structures and how to take care of those forces. Must also realize how such designs should be modified to suit construction conditions. Should have initiative and judgment. Position is with an organization required to design all types of structures entering into the development of hydroelectric power and its transmission. Location Massachusetts. R-545.

MECHANICAL DRAFTSMAN; experience in design of sugar machinery. Position is for 6 months. Living furnished at cost in company clubhouse. Salary $225 per month plus transportation. Location is in Porto Rico. R-1235.

TOOL DRAFTSMAN; experience in designing jigs, fixtures and special machinery. Location New Jersey. R-1237.

FIRE INSURANCE INSPECTOR; extensive experience in fire-insurance inspection work. Man 25 to 30 years of age with five to six years' experience desired. Must have good personality. Location Connecticut. R-1241.

DESIGNER AND ESTIMATOR; drafting-room and shop experience, especially on machine and foundry operations, mostly grinding. Duties consist of work in drafting room on design and estimating, and in plant, on plant layout and investigation of operations. Company expects to use electric furnaces in near future for steel production. Middle-Western men preferred. Location Chicago, Illinois. R-1242.

COMBUSTION AND TEST ENGINEER; experience in combustion and test work in connection with operation of large and small power plants. Location is in St. Louis, Missouri. R-1244.

DRAFTSMAN; first class draftsman with experience on heavy machine-tool work. Location Philadelphia. R-1245.

RECENT GRADUATE; recent college graduate, technical man preferred. Must have personality and excellent address. No previous experience desired. Position is as novice with large insurance company. Location Connecticut. R-1246.

DESIGNER; general machinery-designing experience. Location Pittsburgh, Pa. R-1247.

SALES ENGINEER; must be technical graduate with good practical experience. Conversant with up-to-date shop practice, and familiar with tool set up, time-study work and production. Location Middle West. R-1248.

MECHANICAL ENGINEER; experience on general layout of buildings and machinery; paper-mill experience desirable, but not necessary. Location Canada. R-1253.

MECHANICAL DRAFTSMAN; collegiate or technical training; must have at least two years' shop experience, and must understand plant layout work. Location New Jersey. R-1255.

INSTRUCTOR FOR ROUTINE TESTING; successful teaching experience for position in newly-equipped road-materials laboratory. Location Idaho. R-1259.

HEATING AND VENTILATING ENGINEERING DRAFTSMAN; duties consist of designing and inspecting of heating and ventilating work, plumbing, machine work, temperature control and electric wiring in connection with school house building construction. Location Minnesota. R-1260.

GRADUATE ENGINEER; graduate electrical or mechanical engineer with energy and initiative to assist in organizing and conducting cooperative courses at University. Salary $2000 per year. Location Alabama. R-1262.

DRAFTSMAN; preferably man experienced in conveying machinery, otherwise in structural steel; machine-designing experience essential, however. Location Missouri. R-1263.

ASSISTANT POWER-PLANT SUPERINTENDENT capable of superintending erection of power plant of 8000 b.hp. and the operation of a.c. and d.c. generators and compressors for refrigeration plant of large capacity. Company expects to install, in near future, new high-pressure plant with automatic underfeed stokers. Location New York State. R-1264.

ENGINEER OF WAY AND STRUCTURES; To have charge of construction and maintenance of track, pavements and incidental structures and general charge of maintenance of buildings in electric street-railway organization. Company has about 100 miles of single track, nearly all within city of Havana, built on concrete foundation in streets paved with granite blocks, remainder being suburban line of ordinary steam-railroad construction. Must be able to speak Spanish fluently. Give full information in first letter. Salary $350 per month, but higher salary would be paid to man really worth it. Location Havana, Cuba. R-1266.

RESIDENT AND SALES ENGINEER; Must have experience in re-enforced concrete, design and construction. Must be well up on the theory of design and must be thoroughly practical and have good idea of job organization. Must be accurate, thorough, and have good commercial as well as engineering sense, since he has to be head of sales as well as engineering end of business. Absolutely essential that applicant be single and disposed to stick on the job. Must be a man of some social experience and possess personality calculated to make him desirable member of foreign community and, must be absolutely honest and reliable. Location Singapore. R-1267.

STRUCTURAL ENGINEER; Structural engineer capable of initiating and carrying to completion independent designs for miscellaneous steel work, but more particularly for mill-building construction. Salary $200 per month with travelling expenses to and from Porto Rico. Location Porto Rico. R-1268.

ENGINEER EXECUTIVE; Preferably electrical engineer of high-class executive and organizing ability; diplomatic and convincing in conversation and correspondence; aggressive but not quarrelsome, to act as assistant head of department of 1500 employees distributed throughout the United States. Applicant must be American born, preferably not over 35. Salary $3000. Location is in New York City. R-1270.

WORKS MANAGER to superintend plants manufacturing tractors, steam engines, and grain separators; must have responsible position in similar lines and must be at least 45 years of age. Location is in Indiana. R-1273.

DESIGNER; Must be first-class tool and jig designer, for automobile work. Discharged service men preferred. Location Canada. R-1274.

SERVICE MANAGER; Large scale company, wishes to employ man to manage its Service Department at its main office and factory at Toledo, Ohio, and to supervise its service operations throughout the entire country. Man must be a mechanical engineer with technical training, shop experience and sales or service experience in the field. Two-thirds or three-fourths of his time will be spent at main office, balance of time traveling. Good opportunity for right man. He must not be younger than 30 nor older than 45 years. Must be a proven success, with good ability, best of references and be able to furnish Fidelity Bond. Applications will be guarded as strictly confidential. Location Middle West. R-1276.

SALES ENGINEER; Must have sales experience; metallurgical, mechanical and electrical engineer desired, must also be willing to travel. Salary and bonus. Location Middle West. R-1279.

INSTRUCTOR IN FOUNDRY WORK; Teacher to instruct in foundry work. Location New York City. R-1280.

DRAFTSMAN; Man must be good mathematician, college graduate, with about two years' experience in designing gears. Salary $25 to $30 per week. Location is in New Jersey. R-1281.

MECHANICAL ENGINEER; Young man about 30 years of age who has made a specialty in oiling, or one particularly fitted to organize and supervise a system for keeping all machinery properly oiled and seeing to it that this is done. Salary $40 per week to start. Location Brooklyn, N. Y. R-1284.

DESIGNER, DRAFTSMAN AND ERECTOR; Experimental and service men familiar with semi-Diesel engines. Will consider application from men with experience on Diesel engine work. Only men with this experience need apply for position. Location Massachusetts. R-1285.

VENTILATING ENGINEER; Technical graduate well-grounded in the theory of ventilating engineering. Location is in New York. R-1292.

INSTRUCTOR IN PHYSICS IN M. E. COURSE; Must be recent graduate of college of recognized standing. Location New Jersey. R-1293.

DRAFTSMAN; Experienced, for large machine-tool work. Location is in New Jersey. R-1294.

MACHINE SHOP EXECUTIVE; Must be capable of directing development and production. Must have experience, training and energy to be real doer. Position carries authority as chief engineer, manager and supervisor of production on small brass parts. Requirements are to triple output inside of twelve months. In writing state how your experience warrants your belief that you can handle this proposition. Location Detroit, Michigan. R-1295.

FOUNDRY EXECUTIVE; Must have actual experience in all branches of foundry work; must know how to rig and operate power-machine production both by direction and demanstration, and have energy to do big things. Position carries authority and re-

quires ability to handle plant management. In writing state experience that warrants your consideration for this position. Location Detroit, Michigan. R-1296.

MASTER MECHANIC; Master mechanic to supervise development and equipment problems at point between experiment and operation, in shop engaged in production of small brass parts. Location Detroit, Michigan. R-1297.

INDUSTRIAL ENGINEER; Man with experience in production office of plant operated under scientific management. Location Hoboken, N. J. R-1299.

FOUNDRY SUPERINTENDENT; Manufacturing company planning erection of large grey-iron foundry wants high-grade man as superintendent to follow construction and later assume charge. Must be good executive and organizer on production basis? Give full particulars regarding self, training and experience. Location Middle West. R-1300.

PULP AND PAPER-MILL DRAFTSMAN; Pulp and paper-mill experience desired, but this is not absolutely essential; will consider man with varied construction experience for this work. Location Ohio. R-1301.

MANAGER FOR ILLUMINATING-GAS PLANT; Must have had illuminating-gas plant experience. Openings in North Carolina and Texas. R-1302.

INDUSTRIAL ENGINEER about 28 years of age, preferably mechanical education; must have a few years' experience as machinist and moulder; must be thorough mechanic; must understand modern tools and must have tact in handling men. Some inventive ability desirable. Job is to revamp old shop and foundry and reduce manufacturing costs; will have entire charge of both. Line is heavy machinery in small lots. Location New York State. R-1310.

MECHANICAL ENGINEER to take charge of planning machinery layout including routing and handling of material in process in both new and old factory manufacturing stamped-metal hollow ware. Work involves rearrangement and laying out of punch and draw-press department, tool rooms, machine shops, fitting, buffing, polishing, dipping, finishing, packing and shipping departments, the driving of machinery and the handling of goods. Location Pittsburgh. R-1311.

ASSISTANT PROFESSOR. Should be graduate of first-class technical school or possibly very high-grade trade school; should have experience in teaching and managing courses; must have practical experience and be especially strong in general automobile practice. This position is one of the most important in engineering school of the institute. The holder will be in charge of up-to-date automobile shop with one or two men under him, and will be directly responsible to the Dean of Engineering. The general policy of instruction etc. has been carefully worked out, so he will be expected to fit in with the system and to develope and improve it further. He should enjoy detailed work and above all be systematic. Location New Mexico. Salary $1800 for 9 months' service. R-1315.

ASSISTANT OR ASSOCIATE PROFESSOR for industrial engineering and management work, must be capable of taking charge of lecture and design work of strong organized course. Must be a technical graduate with good practical experience. Photograph and references desired. Personal interview to be arranged for, before appointment. Location Indiana. R-1318.

INTRUCTOR IN MECHANICAL ENGINEERING to assist in laboratory; must have specialized in internal-combustion engines, and be capable of taking charge of small group of laboratory men. Photograph and references desired. Personal interview to be arranged for, before appointment. Location is in Indiana. R-1319.

ASSISTANT IN MECHANICAL-ENGINEERING LABORATORY; To assist in engineering laboratories; may be recent graduate, who has ability and promise as an instructor. Photograph and references desired. Personal interview to be arranged for, before appointment. Location Indiana. R-1320.

DRAFTSMAN for layout of plumbing and water mains. Location Delaware. R-1321.

ENGINEER CORRESPONDENT to correspond with an English publishing concern in such subjects as works' management, organization, etc., and to keep it supplied with up-to-date engineering data. Correspondent will be located in America. Location London, England. R-1325.

DRAFTSMAN; For general design and miscellaneous work, pertaining to mining and milling operations; one familiar with crushing machinery, conveyors, elevators, and power-plant machinery preferred. Location New Jersey. Salary $25 to $35 per week to start. R-1326.

OIL SALES ENGINEER, who is aggressive, who is thorough fuel-oil man, and who can intelligently handle engineering involved in conversion of plants of various character to oil-fired plants, desired. Location New York City. R-1327.

BUSINESS GETTER; Must have executive, sales and business ability for connection with large plant manufacturing medium-weight machines from 1000 to 4000 lbs. Plant has large and well-equipped tool room and is now manufacturing special-testing machinery. Duties of position would be to take charge of getting business and keeping surplus capacity of plant busy. This firm desires man who will handle the proposition on commission basis, although a man desiring salary would not be rejected on that account. Location Philadelphia, Pa. R-1330.

ERECTING AND OPERATING ENGINEER to take charge of erection of gas-producer equipment and to teach customers how to operate such equipment. Position open for one or two men. Location Ohio. Salary $250 per month. R-1339.

SALES ENGINEER to sell gas-producer equipment; must have considerable experience in steel work. Territories now open: Mt. Vernon, Ohio, Chicago, Pittsburgh and New York. Salary $400 to $500 per month. R-1340.

ENGINEER for office position, to do general engineering along lines of gas-producer equipment. Location Ohio. R-1342.

FURNACE BUILDER with extensive experience. Position is with well-established firm, branching into new fields. Location Ohio. R-1343.

GENERAL CONSTRUCTION DRAFTSMAN; Mechanical engineer with five or six years' equipment and constructive experience for industrial building work. Location New York City. R-1349.

PLANNING ENGINEER; Graduate mechanical engineer, with at least five years' plant-planning experience. M. I. T. graduate preferred. This position is third in authority in a woodworking plant which employs from 600 to 700 men. Splendid opportunity for right man. Location New York City. Salary $3000 to $4000 per year. R-1351.

COST AND PLANNING ENGINEER with several years' experience in sugar machinery. Location Pennsylvania. R-1352.

CHIEF DRAFTSMAN; Consulting Engineer's office, specializing in interior mechanical and electrical equipment of buildings, desires chief draftsman to handle entire drafting room employing approximately twelve to fifteen men. Applicant to be technically trained and to have experience in various branches of heating and ventilating, plumbing, electric wiring, power and heating plants, refrigeration, etc., and to have ability as production manager. Location Baltimore. R-1354.

CONSTRUCTION ENGINEER capable of installing power-house equipment. Man with hydro-electric experience preferred, but this is not absolutely essential. Location Potsdam, New York. R-1355.

INSTRUCTOR IN MACHINE DESIGN; Must be technical graduate. Location New Jersey. R-1356.

RECENT MECHANICAL ENGINEERING GRADUATE for work along experimental and research lines. Location Connecticut. R-1357.

CHIEF INSPECTOR required by firm manufacturing small interchangeable parts. Must have previous experience in organizing and maintaining inspection organization. Must have experience in manufacturing limits, good personality and be capable of handling men. Prefer man between the ages of 28 and 38. Exceptional opportunity for live wire in progressive concern. Only those need apply who have references showing previous experience of successful operation of inspection departments as Chief Inspector. Location Michigan. R-1364.

INSTRUCTOR IN MECHANICAL ENGINEERING; Must have teaching and practical experience in steam engineering and machine design. Location Pacific Coast. Salary $1800 to $2000. R-1367.

CREATIVE MACHINE DESIGNER with mechanical ingenuity and practical intuition, who can solve mechanical problems and produce operative mechanisms. The right man will be provided with as many draftsmen and model makers as he can keep busy. Plant production or efficiency engineers will not do; the man must have had not less than three years' actual experience in the development of complicated machinery, such as textile, automatic forming, wrapping etc. Applications should be very specific as to experience and in addition should state age and salary expected. Location New York City. R-1368.

SALESMAN with extensive sales experience to sell valves and power-plant equipment; position requires some travelling. Location New York City. R-1369.

INSTRUCTOR; Young college graduate with possibly one year or more experience in practical work and teaching. Location Brooklyn. Salary $1200 to $1500. R-1374.

DRAFTSMEN AND DESIGNERS with two or three years' practical experience designing jigs and fixtures for high-class interchangeable parts. Location Hartford, Conn. R-1375.

RESIDENT CIVIL ENGINEER with experience in supervising construction of hydro-electric power plants including dams, power stations and transmission lines. Previous experience on similar work essential. Location Eastern Canada. R-1377

CHIEF ENGINEER to take charge of plant operating 24 hours daily, including Sunday. This man to be in charge of men in plant consisting of two 300-hp. boilers with automatic stokers and a 500 kw. De Laval steam turbine direct-current generator. Turbine operates on superheated steam, running condensing with surface condenser and spray pond. Power is used for electrolytic process and plant runs with solid unvarying load. Location New Jersey. R-1378.

COMBUSTION ENGINEER. Young man, four or five years out of college, with experience on Diesel engines. Location New York City. R-1379.

DESIGNER. Mechanical engineer with extensive experience in designing of locomotive cranes. Location New York City. R-1383.

PRODUCTION ENGINEER OR SUPERINTENDENT to act as assistant to superintendent taking charge of planning department and production in growing manufacturing concern with machine shop, blacksmith shop and foundry. Energetic young man with some previous experience and ability to handle men desired. Location Michigan. R-1386.

MECHANICAL DRAFTSMEN. Two draftsmen experienced in hoisting machinery and motor-truck designing. Steady work and opportunity for advancement. Location Michigan. R-1387.

ASSISTANT SUPERINTENDENT with at least two years' plant experience. Location New Jersey. R-1388.

EFFICIENCY PLANT ENGINEER for public utility work. Must have personality, tact, and be able to make investigations and tests. R-1389.

DRAFTSMAN. Must have heating and ventilating and power-plant piping experience; must be able to design piping for boilers and engines on ships. Location New York City. R-1392.

MECHANICAL ENGINEER. Technical graduate to assist in compilation of engineering hand books and to write advertisements, circulars, etc. Position offers unusual opportunities for promotion and earnings. Location New York City. R-1393.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 12th of the month, and the form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

MECHANICAL ENGINEER. Technical graduate, age 27, with four years' varied manufacturing experience, desires to get in touch with concerns contemplating an extension of foreign trades in Armenia or Turkey. A-4045.

MECHANICAL ENGINEER. Graduate of M. I. T. Expert on design and experimental work. Held responsible experimental and executive position for 17 months during war as Captain Ordnance Department, U. S. A. Devised and perfected several useful inventions for the service. Qualified as assistant to executive on engineering problems. Now employed at $3000 per year, but desire change to above line. Qualified to handle men. Age 29, married. A-3981.

INDUSTRIAL ENGINEER. Columbia University graduate in mechanical engineering, with four years' experience as production engineer and assistant superintendent of machine shop, forge and foundry, desires position in similar capacity or as assistant to an executive. A-3976.

POWER-PLANT ENGINEER, technical graduate, age 30. Eight years' experience principally in power-plant design and operation. At present in charge of large steam and gas power, pumping and blowing plant in large steel mill. Salary $5000. A-4141.

MECHANICAL ENGINEER ON INDUSTRIAL WORK. Technical graduate, American, age 36; married. With broad technical experience, including practical shop experience, and covering design of boilers, tanks, structural steel, factory buildings, layouts, installation of machinery and general industrial plant construction. Desires position with large company having number of manufacturing plants, as mechanical engineer in charge of maintenance and extension of plants and construction of new plants. Only high-grade connection requiring energy, initiative and tact will be considered. A-2180.

ENGINEER EXECUTIVE OR SALES ENGINEER desires position where executive ability, engineering and business experience are required. Age 32 years; technical education; several years varied engineering and sales experience in this country and abroad; speaks several foreign languages; also experienced on railroad equipment, steel construction, and plant maintenance as plant or works engineer; considered very capable organizer and executive; formerly Captain U. S. A.; can present best references; location, immaterial. A-3063.

MECHANICAL AND ELECTRICAL ENGINEER, visiting Europe in October, and returning in January or February, would like to get in touch with one or two concerns who could use part of his time to advantage in representing them, in either business or confidential matters; at present holding influential position with large manufacturing concern whose business will only take small part of his time; is of smart appearance, good address, and can produce best references. A-1706.

SALES MANAGER AND ENGINEER. Degree of M. E. Twenty years of active experience in power-plant machinery and engineering practice, with clean record. Now employed in the West, but desires location East of Buffalo. Present salary, $7,500. Cannot consider less than $8000. A-4142.

CONFIDENTIAL AGENT. Open for part or full-time engagement. Investigations of methods, equipment or personnel carried out with secrecy and despatch. Highest references. A-3988.

MECHANICAL ENGINEER, age 26 years, M. E. degree, would like to connect with large organization as assistant works engineer; three years' experience in general maintenance in large manufacturing plant; also experience in steam and Diesel power-plant operation and general machinery design. At present employed. Salary $2500. A-4143.

CHIEF DRAFTSMAN, technical man, age 29, seven years' experience on automobile and airplane engineering, desires connection with progressive company. Good handler of men and can guarantee results. Only permanent position with good future will be considered. A-4027.

MEMBER of United States Government Trade Commission to Europe and Army officer desires executive appointment. Engineering, manufacturing and sales experience in high-class electric, steam and hydraulic machinery lines. A-1457.

SALES ENGINEER, graduate mechanical engineer with five years' experience in marine, power-plant and chemical engineering practice, wishes to represent manufacturer in Philadelphia district. Has had two years' experience as purchasing engineer of marine equipment. A-4144.

DESIGNING ENGINEER, age 27, married, technical education, eight years of electrical and mechanical machine design of small and medium sized electro-mechanical apparatus, wishes position with reliable and growing concern. New York vicinity preferred. A-4029.

MANAGER OR ASSISTANT SUPERINTENDENT wishes position where initiative and ability to get results are wanted. Ten years' practical experience as superintendent and chief draftsman in States and Canada. Age 31; married; willing to locate anywhere in Canada or United States. Thoroughly familiar with modern practices in machine shop, pattern work and foundry. Very successful in handling men. Minimum salary, $3000. A-3994.

INDUSTRIAL ENGINEER. Graduate mechanical engineer with eight years' practical manufacturing and business experience desires connection with progressive industrial enterprise. Familiar with up-to-date manufacturing methods, with rate setting, time study, plant maintenance, and general shop management, covering machine shop, pattern shop, structural and steel shop, and foundries, both gray iron and malleable. Two years' experience in executive capacity in the War Department, in charge of accounting and sales function, covering all salvage. Would prefer position in executive capacity as manager or assistant to president or similar official. Interview if desired. A-3998.

MECHANICAL ENGINEER; age 28; experienced in design and testing of mechanical and electrical apparatus and in organization work, desires position with industrial concern. Capable of taking charge of development of new apparatus or acting as assistant to chief engineer and possessed of ingenuity and imagination. Minimum salary $2200. A-4076.

EXECUTIVE ENGINEER. Eighteen years' experience, design, construction, administration and management, operation and maintenance. Conservancy engineering; municipal and industrial water supplies and sewerage systems; highways; valuations, statistical problems; municipal and industrial water-waste and power-waste investigations; drainage; land development; labor, personnel, and employment problems. Major of Engineers in U. S. Army. Desires connection with strong organization where experience and initiative count. Available on short notice. A-232.

MECHANICAL ENGINEER, technically educated, having some knowledge of French, German and Spanish, has had twenty years' experience in machine-shop, drafting-room, power-plant operation, building inspector, sales engineer and specialty engineering lines. Has held responsible positions as assistant chief engineer, superintendent of refrigeration, superintendent of construction, chief engineer, master mechanic, sales engineer and sales manager. Have lately been released from Army service and desire position in line of above experience. A-2304.

ENGINEER OR ASSISTANT MANAGER of industrial plant, age 44; married; technical graduate; six months of reinforced concrete work; six years assistant engineer in charge of office on tunnel work and inspector of tunnel construction; eight years engineer and chief draftsman as production; manufacturing civil and mechanical engineer. Now engineer in mechanical development work in glass industry. A-2078.

WORKS MECHANICAL ENGINEER, now employed in modern manufacturing plant, desires change. Has extensive experience along chemical lines. A-4145.

ASSISTANT TO SUPERINTENDENT or similar position. Discharged army officer, age 31, pleasing personality, tactful and practical. Thirteen years' experience on design and manufacture of various lines of press tools, jigs, fixtures and gages for quantity production and inspection on small parts; also good knowledge of manufacturing methods in general; six years in charge of important work in positions similar to the one desired. Salary $3000. A-2408.

MECHANICAL ENGINEER AND DESIGNER, eighteen years' experience in railway motive power and rolling-stock design, testing materials, electrical machinery, and as chief draftsman for foundry and machine company. Past ten years with large steel plant as executive and designing engineer on mechanical, hydraulic and special structural work. Thoroughly familiar with modern shop practice, good organizer and executive. Can handle men to best advantage. Desires position of responsibility on either operating or engineering end. Age 37; married. A-3058.

ENGINEER EXECUTIVE, graduate of both university and highest class technical school as mechanical engineer. Seven years' experience with large concern, building and operating two plants. Experienced principally in light metal-working but readily adaptable to any business. Age 32. Special opportunity for advancement desired. A-4220.

MECHANICAL ENGINEER, technical graduate, age 26, served as engineering officer in U. S. Navy during war. Four years' varied engineering experience, both as draftsman and engineer in connection with power-plant equipment, ball-bearing industry and chemical plants. Desires position either as assistant engineer or in sales engineering. Salary, $2600. A-435.

MECHANICAL ENGINEER. University graduate. Three years' experience on locomotive and car work as special apprentice in railroad shops; one year on locomotive efficiency and tonnage rating tests. Recently released as Lieutenant of Engineers, U. S. A. Desires position with opportunities for advancement. Location in Middle West preferred. A-4223.

WORKS MANAGER. Executive with broad experience in machine building and interchangeable manufacturing desires change. Is well posted in modern organization as well as mechanical methods and has ability to handle men to an unusual degree. Has been with present employers for seven years. A-4222.

POWER-SYSTEM EXECUTIVE; engineering graduate; ten years' experience in construction and operation of high-voltage high-power generating stations; transmission lines, substations and distribution systems; at present employed at salary above $4,500, but desires opportunity for greater service and responsibility in line of operation, construction or general design. A-4224.

HEAT TREATER AND CHEMIST with eighteen years' experience in foundry and steel-work analysis and heat-treating of all sizes and grades of carbon and alloy steels, both mill and forge products, to meet marine, railway, special and army and navy requirements, open

for engagement. Eastern location desired. A-4221.

PRODUCTION ENGINEER, technical graduate, age 29. Five years' experience manufacturing electrical supplies. Thoroughly familiar with planning, scheduling and routing work, time and motion study, rate setting and wage payment systems. Experienced as foreman polishing and grinding department. Discharged from the army; available immediately. Location preferred—Middle West. A-2008.

PROFESSOR OF MECHANICAL ENGINEERING OR OF INDUSTRIAL EDUCATION. Graduate in mechanical and electrical engineering with B. S. and M. S. degrees. Eight years' experience teaching a variety of engineering and industrial subjects in two large state universities and in an industrial school. Practical engineering experience covering number of years in design, construction and operation. Age 33; married. A-4225.

MECHANICAL AND ELECTRICAL ENGINEER, army officer, age 38, two years' civil engineering course and six years mechanical and electrical university course; graduated in 1907. Engineering experience covering 14 years, includes important branches of the construction of industrial plants, locks and dams, the Hog Island Ship Yard, a powder plant, a rifle plant and an armor-plate plant, consisting of the installation of hydraulic, steam, air and electrical machinery. Thoroughly practical with executive ability. Desires to make change, no objection to foreign service if salary is commensurate with position and location. Minimum in the United States, $4000. Willing to enter into partnership with another engineer on equal basis. At present employed, but can arrange to make change on short notice. A-4226.

TURBINE DRAFTSMAN, six years' experience in design of small steam turbines. Married; age 27; desires position with small concern in either sales or engineering department; would consider position where his services could be used outside of drafting room. A-4227.

EXECUTIVE. Captain, Inspection Division Ordnance Department (discharged), four years' shop experience, ten years' design and constructio nof industrial plants, desires position where knowledge of shop practice will be of value. A-1345.

MECHANICAL ENGINEER, graduate of University of Michigan, age 36 years; open for position requiring executive ability, initiative, and tact acquired from thirteen years' general engineering experience in construction, sales, heating, maintenance, test and experimental work. At present employed in East, but prefer to locate in or near Detroit. A-4229.

MECHANICAL ENGINEER; qualified for chief draftsman, assistant to mechanical engineer, works manager or similar position, desires engagement where experience, education, and ability will be of service; age 33; married; university graduate; eleven years' experience in machine design, mill engineering, plant layout, installation of machinery, etc. Experience covers actual shop practice and supervision in field as well as extensive drawing room work. A-4228.

ASSISTANT TO CHIEF ENGINEER, has had sixteen years' experience in design and manufacture of automatic machinery and light mechanisms; in charge of test and experimental work. Thoroughly familiar with best practice in economical manufacture and labor-saving methods; broad knowledge of plant layout; very successful on development work. Pleasing personality and clean record as an executive. Recently completed important production and experimental work for the Ordnance Department. Available immediately. A-1573.

WORKS MANAGER with twenty years' experience in manufacturing automobiles, typewriters, firearms and interchangeable parts, including one and one-half years' building of heavy artillery; thorough organizer; familiar with latest practices of plant management and modern efficiency methods; desires connection with large progressive concern. A-331.

MECHANICAL ENGINEER, age 36, seeks connection with growing and progressive concern as works manager or in similar capacity. Sixteen years' experience in design of locomotive specialties, valves, etc. Has had charge of shop and brass foundry, purchasing of materials, sales correspondence, etc. Registered patent attorney. Preferred location New York or vicinity. Salary $4000. A-4230.

PLANT MANAGER OR GENERAL SUPERINTENDENT, broad experience with large organizations. Active and progressive executive with successful record in handling labor. Practical knowledge of up-to-date manufacturing in all its branches. Experienced in manufacture and design of special machine tools, electrical machinery, motors, pumps, power-house equipment and iron and brass parts in large quantities. American, age 41. A-4232.

MECHANICAL ENGINEER experienced in design, layout and construction of industrial plants. Last year and half in responsible charge of construction. Also capable of designing special machinery. Minimum salary $3000. A-2992.

KEEN, AGGRESSIVE YOUNG EXECUTIVE, university credit in mechanical and electrical engineering; ten years' practical experience shop organization, designer of machinery, and plant layout, desires to become associated with manager of large manufacturing concern, Eastern States. A-4233.

ASSISTANT TO GENERAL MANAGER OR PLANNING ENGINEER. At present employed as head of cost and production departments of well-known machinery company. Seven years' experience covering wide range of manufacturing in various executive positions; lowest salary to start $5000 per year. A-3243.

FUEL AND COMBUSTION ENGINEER. Mechanical graduate, with ten years' experience in fuel engineering, as testing engineer for large coal company, wishes position with engineering firm or industrial concern whose economy in use of fuel is important factor. Could handle fuel purchasing to great advantage. A-4234.

MECHANICAL ENGINEER OR SUPERINTENDENT, technical graduate, with 15 years' practical experience in estimating and designing special apparatus of sheet and plate steel, tank work, low-pressure and high-pressure boilers, coal pulverizers and chemical apparatus. Good executive, successful experience in handling help and producing results. At present in charge of engineering department of old established concern, where field is not broad enough for experience and ability. Minimum salary $4000. A-4231.

SALES ENGINEER desires the New York agency for an engineering product selling to the amount of hundreds or thousands of dollars per sale. Power equipment preferred. Would welcome a hard missionary fight for a worthy article. Salary and commission. A-4235.

TECHNICAL GRADUATE, age 26, married, desires position as assistant to works manager or mechanical engineer or as chief draftsman. Four years' experience in construction, mechanical, aeronautical engineering, and machine and tool designing. Well versed on high-speed internal-combustion engines. Served two years with the rank of Lieutenant (j. g.) in the U. S. N. Air Service as a pilot and experimental aeronautical engineer. A-4237.

MECHANICAL ENGINEER, graduate with over 20 years' experience, including five years in shops, desires position as chief engineer or consultant; can take charge of or advise on design and installation of power plants, pumping stations and distributing systems for water; inspect and test materials for construction, boilers, engines, turbines, pumps, motors, generators, etc.; has had valuable experience in fuel economy and smokeless combustion. Location New York vicinity preferred. A-4236.

ASSISTANT SUPERINTENDENT OR CHIEF INSPECTOR; age 33 years, technical education; 12 years' practical experience in design, manufacture and assembly of interchangeable parts on mass production, as foreman, planner, chief inspector and assistant to superintendent; energetic, resourceful, efficient organizer; can furnish best of references; desires position in or near Philadelphia. A-3266.

PLANT ENGINEER OR MASTER MECHANIC. Technical graduate, excellent executive, successful in handling men, tactful and diplomatic; 17 years' experience in electrical and mechanical engineering, including installation and maintenance, power and industrial plant, heating and lighting layout; organization and production engineering. A-1496.

EXECUTIVE ELECTRICAL AND MECHANICAL ENGINEER, recently administrative officer of large government plant, with extensive experience in design and construction of steam and hydro-electric plants, special electrical and manufacturing equipment and the design of special electrical control systems, is open for engagement, 34 years of age; married. Salary $3000 to $5000, depending upon location. A-3196.

MECHANICAL AND CIVIL ENGINEER desires connection with industrial concern where his 18 years' experience in construction, operation and administration of cement, lime and chemical plants can be fully utilized. A-3019.

MARINE ENGINEERING EXECUTIVE AND SALES MANAGER; age 33; married; American; has had full machine-shop apprenticeship; former owner and manager of marine specialty and repair shop; ten years' active sea service, has chief's unlimited license; is familiar with recent marine-engineering devices and customs; good personality; excellent references. Minimum salary $6000. A-4238.

SALES ENGINEER, technical graduate, with several years' experience in design, manufacture and operation of power-plant equipment, wishes position in sales or manufacturing work or an opportunity to develop into sales work. In return can offer an aggressive and initiative mind. A-4239.

SALES ENGINEER, age 26, technical education, three years' experience as draftsman on sheet metal machinery, presses and dies; knowledge of mill equipment, conveyor and power transmission machinery, desires to connect with machine-tool concern in sales capacity. Prefer location in or near New York City. A-4240.

ENGINEER EXECUTIVE, with 14 years' industrial experience, including organization, management analysis work, production control, and design of automatic machines and labor-saving devices; now employed as assistant to the general manager of prominent mechanical industry; desires location where further advancement is possible. Cornell M. E. graduate; married; age 33. A-2158.

EXECUTIVE ENGINEER; technical education; recently discharged from army, desires position of executive nature. Several years' experience in mechanical engineering and business management, including plant construction and operation, design, manufacture and installation of equipment and sales management. A-3085.

FOREIGN REPRESENTATIVE, experienced sales engineer, American; 40 years; married, desires to represent one or more firms in the three Scandinavian countries and Finland. Possesses language qualifications and has had extensive experience in the auto-sprinkler business in charge of engineering and construction as well as of sales, would consider connection in this line of work. A-4251.

EASTERN SALES ENGINEER, with modern offices in Newark, N. J., business centre, wishes to connect with concern needing an aggressive and practical man with shop experience and knowledge of export trade; has traveled abroad, speaks French, Spanish, German, and Russian. A-3658.

MECHANICAL AND PRODUCTION ENGINEER, technical graduate; age 25; experience in production-engineering work and general shop work; past two years as 1st Lieutenant, Engineers, U. S. Army; desires position which has good opportunity for advancement, preferably along production-engineering lines. A-4252.

PRODUCTION AND COST ENGINEER; gradu-

ate, ten years' practical experience in metal-working industries specialized in planning, routing, time study and graphic analysis of shop vital statistics, desires executive position. Recently discharged from the service and can furnish excellent references; 31 years old, married; salary $3600. A-1071.

SALES-ENGINEERING POSITION wanted by mechanical and electrical engineer; age 30, technical graduate; has good knowledge of shop practice, and experience upon all types and sizes of internal-combustion engines, pumps, compressors, motors, generators, gas plants, and small rural electric systems. A-3418.

MECHANICAL ENGINEER, officer U. S. Air Service, desires position that will eventually carry him into selling; has had seven years' general mechanical engineering experience in design and manufacture; executive ability and shop experience. Location no object. Married; minimum salary $2100. A-4253.

SUPERINTENDENT OR PRODUCTION MANAGER; college graduate with 20 years' experience in shops and designing; practical experience in manufacturing and assembling interchangeable parts on mass production. Location immaterial, can furnish best of references. Age 40, at present employed but desires change of position. A-2975.

INDUSTRIAL ENGINEER; 25 years' experience covering design, sales, purchase and executive work, both commercial and engineering, in connection with mining and smelting operations, desires position on the Pacific Coast. Age 45. Married. A-1492.

MECHANICAL ENGINEER of broad experience covering 25 years, now located on Pacific Coast, desires position of responsibility along the lines of public utilities; mines and smelters; power plants; economical handling of materials, or organization and system. A-4273.

HIGH GRADE ORGANIZATION BUILDER; 15 years' experience as works manager and superintendent; a thorough mechanic, familiar with modern methods. Age 38. Location immaterial. A-2252.

GRADUATE MECHANICAL ENGINEER, age 36, married, ten years' experience in heating, ventilating and air conditioning for factories, office buildings, schools, munition plants, etc. At present employed but desires responsible position in charge of work in above line. Salary $4500 per year. A-4299.

DESIGNING ENGINEER DRAFTSMAN wishes to connect with firm in mechanical line of manufacturing, preferably steam or internal-combustion engines. Has had ten years' experience in mechanical, electrical and steam equipment designing and some installations. Location St. Louis or vicinity. Good references. A-4193.

MECHANICAL ENGINEER with seven years' experience in factory organization and management desires executive position. Has thorough knowledge of modern cost and prediction systems, and has demonstrated ability to install same. Until recently in war work. Prefers location New York, Philadelphia or Boston. A-4298.

TECHNICAL GRADUATE, 1918, B. S. degree in mechanical engineering, single, age 23, honorably discharged soldier; three years' practical shop experience; familiar with foundry practice. At present employed, but seeks change where opportunities for advancement are greater. New England or vicinity of New York City preferred. A-4300.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER SEPT. 18

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 359.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by Sept. 18, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

Alabama

HALE, FRED E., Chief Draftsman, Alabama Power Co., Birmingham
SPELLACY, JOHN F., Superintendent of Shops, T. C. I. & R. R. Co., Fairfield

California

BURTCHAELL, ARTHUR E., Consulting Engineer, Self, Mechanical Production, San Francisco
DRAKE, GEORGE F., Vice President & Manager, Drake Lock Nut Co., San Francisco
ROBERTSON, ROBERT R., Technical Assistant, Bureau of Power & Light, Los Angeles

Colorado

SEARS, HAROLD T., Student Engineer, Great Western Sugar Co., Brighton

Connecticut

BENTON, LEICESTER F., Jr., Mill Engineer & Designer, American Thread Co., Willimantic
BERARD, SAMUEL J., Instructor, Sheffield Scientific School, New Haven
BRADSTREET, GEORGE F., Assistant Equipment Engineer, Remington Arms Union Metallic Cartridge Co., Inc., Bridgeport
CHANDLER, ROY W., Director Industrial Research Yale & Towne Manufacturing Co., Stamford
CONEYBEAR, JOHN F., Major, Ordnance Department, U. S. A., Engineering Manager, Bridgeport District Ordnance Office, Bridgeport
DAVIS, DAVID, Chief Draftsman, The Shoe Hardware Co., Watertown
DEXTER, A. MORTON, Fire Insurance Engineer, Factory Insurance Assn., Hartford
FINCH, CLARENCE M., Safety Engineer, Research Division, Bureau of Inspection and Accident Prevention, Aetna Life Insurance Co., Hartford
HARTWIG, ALBERT, Manager Factory Engineering, Connecticut Telephone & Electric Co., Meriden
HEYMANN, F. ADOLF, Standardizing Engineer & Chief Draftsman, Premier & Potter Printing Press Co., Inc., Derby
JACOCKS, GEORGE T., Works Manager, Whitlock Coil Pipe Co., Hartford
NEWMAN, JOHN P., Assistant Mechanical Superintendent, Landers, Frary & Clark, New Britain
PETTERSON, OSCAR G., Machine Designer, Whitney Manufacturing Co., Hartford
REEVES, EDWARD H., Scientific Assistant, U. S. Public Health Service, New Haven
SEIFERT, MORRIS F., Tool Designer, Winchester Repeating Arms Co., New Haven
STONE, HARRIS D., Electrical Engineer, A. C. Gilbert Co., New Haven
THOMPSON, WILLIS F., Designer, Westcott & Majors, Inc., New Haven
WOLF, HERBERT J., Plant Draftsman, Bridgeport Brass Co., Bridgeport
YOUNG, FRANK A., Chief Draftsman, Connecticut Telephone & Electric Co., Meriden

Delaware

KENNEDY, WALTER C., Operating Engineer, Worth Steel Co., Claymont
LINDSLEY, ADRIAN VAN S., Wilmington
MALONEY, JOHN M., Division Engineer, E. I. DuPont de Nemours Co., Wilmington
PHELAN, PATRICK A., Design Engineer, E. I. Dupont & Co., Wilmington
SEAMAN, HOWARD L., Assistant Secretary, Lobdell Car Wheel Co., Wilmington

District of Columbia

BAKER, BERTIE F., Skilled Draftsman, Ordnance Department, Washington
BURTON, SYDNEY W., Mechanical Draftsman, Ordnance Engineering Bureau, War Dept., Washington
CONNORS, FRANK J., Captain, Ordnance Department, U. S. Army, Washington
CRUICKSHANK, BENJAMIN C., Assistant Physicist, Bureau of Standards, Washington
DICKINSON, HOBERT C., Physicist, National Bureau of Standards, Washington
HAIGH, JOSEPH A., Master Gage Expert, Bureau of Standards, Washington
HANSON, ALFRED E., Associate Engineer, Bureau of Standard, Washington
HEALD, ROY H., Assistant Physicist, U. S. Bureau of Standards, Washington
KAVANAGH, THOMAS J., Lieutenant, Chief of Gage Branch, Ordnance Dept., U. S. A., Washington
MCCAUSLAND, JOHN W., Ensign, Bureau of Steam Engineering, Navy Dept., Washington
NOSS, OSCAR F., Lieutenant Colonel, Officer in Charge Procurement Division, Construction Division, U. S. A., Washington
ROBINSON, J. ALBERT, Research Engineer, Special Agent Safety & Hygiene Federal Board of Vocational Education, Washington
SACK, EDWIN L., Designer, Ordnance Engineering, U. S. Army, Washington
WETHERILL, FREDERICK V., Assistant Mechanical Engineer, U. S. Bureau of Standards, Washington
WOODWARD, FRANCIS A., Instructor, George Washington University, Washington

Georgia

FREDERICKSON, L. M., Mechanical Engineer, Steam Dept., Lockwood Greene & Co., Atlanta
SNYDER, WILLIAM, Mechanical Engineer, The Georgia Marble Co., Tate
WOODCOCK, FRANK W., Assistant Superintendent & Chief Engineer, Brunswick Marine Construction Corp., Brunswick

Illinois

BRUTUS, CARL R., Sales Engineer, Chicago Pneumatic Tool Co., Chicago
CHISE, GEORGE X., Sales Manager, Chise Engine & Manufacturing Co., Mattoon
EMERICK, JOHN H., Sales Engineer, Sullivan Machinery Co., Chicago
ENGLAND, FRANK W., Vice President, Illinois Tool Works, Chicago
FREUND, HERBERT E., Partner, Mechanical Engineering Service Co., Chicago
GILBERT, FRANK B., General Manager, Dwight Manufacturing Co., Chicago
GRIEST, EUCLID E., Assistant General Superintendent, Chicago Railway Equipment Co., Chicago
HALL, ROY B., Mechanical Engineer, J. T. Ryerson & Son, Chicago
HUNGERFORD, WARREN H., Vice President & Mechanical Engineer, Peters Machinery Co., Chicago
HUSEBY, ALBERT W., Chief Engineer, Armour Mechanical Co., Chicago
KELLY, WALTER T., Mechanical Engineer, Illinois Central R. R., Chicago
KOEHLER, PERCY B., Sales Engineer, East St. Louis Bridge Co., East St. Louis
KRANE, LEONARD J., Steam Engineering, Wilson & Co., Chicago
LANG, EUGENE C., Engineer, Sessions Engineering Co., Chicago

LEWIS, RAYMOND L., Assistant District Mechanical Engineer, American Steel & Wire Co., Waukegan
LOCKARD, ALAN T., Superintendent, Rathbone, Sard & Co., Aurora
MCMULLAN, S., Mechanical Methods Supervising Engineer, Western Electric Co., Inc., Chicago
MACFARLANE, WARREN C., Vice President, F. B. Hitchcock & Co., Chicago
MOTSINGER, HOMER M., Works Manager, U. S. Ball Bearing Mfg. Co., Chicago
MUNK, WILLIAM L., District Manager, Tate Jones Co., Inc., Chicago
PARRISH, C. FRANK, Manufacturing Expert, Western Electric Co., Chicago
PLATE, HARRY V., Mechanical Engineer, Wm. A. Baehr, Chicago
ROBERT, JOHN, Mechanical Engineer, G. R. Gehrandt, Chicago
RUDOLPH, WALTER J., Chief Engineer, Imperial Brass Mfg. Co., Chicago
STASTNEY, LADISLAV, Special Machine Designer, Western Electric Co., Chicago
STOUFFER, CHRISTIAN S., Works Engineer, Walworth Mfg. Co., Kewanee
ZELLER, JAMES A., Engineer on Special Work, The Pullman Co., Chicago

Indiana

HEER, W. SCOTT, Assistant Manager & Mechanical Engineer, Power Supply Co., Terre Haute
POPP, GEORGE R., Jr., Assistant Engineer, Indianapolis Water Co., Indianapolis
RICHHART, WILLIAM S., Electrical Engineer, Fort Wayne & Northern Indiana Traction Co., Fort Wayne
SCHAEFER, C. T., Chief Engineer, Arvac Manufacturing Co., Anderson
UNDERWOOD, CLARENCE A., Efficiency Engineer, Northern Indiana Gas & Electric Co., Hammond
WYNNE, THOMAS N., Superintendent Indianapolis Light & Heat Co., Indianapolis

Iowa

CARSON, HIRAM J., General Manager, Cedar Rapids Gas Co., Cedar Rapids
CRAWFORD, LEIGH R., Superintendent, Sioux City Service Co., Sioux City
MEAD, EZRA B., Chief Engineer, Ottumwa Iron Works, Ottumwa

Kentucky

CARPENTER, FLOYD S., Combustion Engineer Louisville Water Co., Louisville

Louisiana

BAYNE, CHARLES W., Manager, Appalachian Corp., New Orleans
HOOD, JAMES R., Erecting Engineer, O. J. Morris & Co., New Orleans
PENDER, WINFIELD R., Erecting Engineer, A. M. Lockett & Co., New Orleans

Maryland

HANNUM, JOSHUA E., Head of Industrial Dept., The Red Cross Institute for the Blind, Baltimore
KENNY, JOHN M., Mechanical Engineer, Ordnance Dept., U. S. A., Baltimore
WRIGHT, PERCY E., District Manager, The Poole Engineering & Machine Co., Baltimore

Massachusetts

BERRY, LAWRENCE F., Assistant Manager, Howard Storage Warehouse Co., Boston
BISBEE, HARRY K., Foreman, Waltham Watch Co., Waltham
BLAIR, ERNEST L., Mechanical Engineer, Lockwood, Greene & Co., Boston
FALLER, ALBERT E., Draftsman, Lockwood, Greene & Co., Boston
GAY, R. V., Machinery Boards, Watertown Arsenal, Watertown
HAMMOND, TREMONT M., Shift Engineer, Marconi Wireless Telegraph Co., Marion
HOWES, PAUL C., Assistant Secretary to Quotation Manager, Morse Twist Drill & Machine Co., New Bedford
KELLEY, GEORGE H., Assistant Chief Draftsman, U. S. Cartridge Co., Lowell
LAW, ADAM J., Manager, West & Dodge Co., Boston
MCCAMPBELL, JOHN A., Superintendent of Construction, Stone & Webster, Boston
NELSON, IRA S., Engineer, Hill-Smith Metal Goods Co., Boston
PERRY, EDWIN H., Superintendent of Production, Worcester Electric Light Co., Worcester
PORTER, PAUL A., Chief Draftsman, Reed & Prince Manufacturing Co., Worcester
POWELL, HARVEY J., Student Engineer, General Electric Co., Lynn
SAWYER, CLARENCE B., North Eastern Sales Manager, Cressan Morris Co., Boston
SCHLITT, J. L., Turbine Engineering Department, General Electric Co., West Lynn
SIMMONDS, ROLAND E., Fire Protection Engineer, Mutual Fire Insurance Co., Boston
TUTEIN, DEXTER A., Winchester
WILSON, ERNEST D., Chief Engineer, Graton & Knight Mfg. Co., Worcester

Michigan

ANDERSON, ERNEST E., Chief Draftsman Goddard & Goddard Co., Detroit
ANDERSON, O. BENJAMIN, Manager, E. J. Longyear Co., Marquette
ANDRUS, LUCIUS B., Chief Engineer, Kelsey, Brewer & Co., Grand Rapids
BISHOP, JOSEPH W., Experimental Engineer, Brunswick-Balke-Collender Co., Muskegon
BOEN, LORAN F., Chief Draftsman, Champion Ignition Co., Flint
DRYSDALE, WALTER D., Plant Engineer, The Detroit Edison Co., Detroit
FREDERICK, WALTER A., Chief Engineer, Continental Motors Corp., Detroit
HORNBROOK, RALPH D., Power Engineer Hudson Motor Car Co., Detroit
PALMER, ROGER C., Erecting Engineer, Underfeed Stoker Co., of America, Detroit
RENNELL, LORENCE E., Tool Estimator, Lincoln Motor Co., Detroit
SIMMONDS, FRANK A., Consulting Steam & Sales Engineer, Grand Rapids
SMYSER, FALOR E., Efficiency Engineer, The Monroe Corrugated Box Co., Monroe
VAN KAMMEN, ISAAC J., Lieutenant, U. S. Navy, Grand Rapids
WALKER, HARRY G., Head of Standard Department, Chevrolet Motor Co., Flint
WHITTEN, FRANK A., Chief Engineer, General Motors Truck Co., Pontiac

Minnesota

SUMMERSBY, JOHN J., JR., Sales Engineer, Worthington Pump & Machinery Corp., St. Paul

Mississippi

JONES, PAUL T., JR., Director of all designing & Manufacturing Corinth Machinery Co., Corinth
PATERSON, ALBERT B., Partnership, Paterson & Shurgar, Meridian

Missouri

GOODWIN, WILLIAM G., Chief Engineer & Superintendent of Water Dept., Kansas City
HINCHMAN, GEORGE N., Mechanical Engineer & Designer, Alvery Mfg. Co., St. Louis
MENNER, FREDERIC B., Works Engineer, Scullin Steel Co., St. Louis
SHEEHAN, WILLIAM M., Sales Engineer, Commonwealth Steel Co., St. Louis
TYLER, CYRIL M., Assistant Mechanical Engineer, H. L. Doherty & Co., St. Joseph
WELLS, GEORGE E., Consulting Engineer, St. Louis

Nebraska

BUELL, D. C., Owner & Director, Railway Educational Bureau, Omaha

New Hampshire

DOWNING, HARRY F., Designing Draftsman, U. S. Navy Yard, Portsmouth
NUTTER, ASA P., Mill Superintendent, Joshua Nutter, Woodsville (Re-Election)
RICE, LEON H., Shop Foreman, Leighton Machine Co., Manchester

New Jersey

AUMACK, HOWARD W., Assistant Production Manager, Slocum, Avram & Slocum, Newark
BENSON, GEORGE, JR., Charge of Engineering Department, Kihm Bowen Machine Co., Irvington
BLACK, WILLIAM A., JR., Engine Department Federal Shipbuilding Co., Kearney
CHEN, YUNG HAN., W. & A. Fletcher Co., Hoboken
COUCH, DAVID H., Superintendent of Power, The Barber Asphalt Paving Co., Maurer
DE RONDE, LOUIS A., Civil Engineer & Surveyor, Englewood
DOLPHIN, RICHARD T., Mechanical Engineer, Crucible Steel Co., of America, Harrison
FISH, J. ARTHUR, Engineer, The Roessler & Hasslacher Chemical Co., Perth Amboy
FOLGER, OLIVER H., Superintendent of Distribution, Public Service Gas Co., Newark
GEIGER, J. WILBUR, Assistant Mechanical Engineer, Singer Mfg. Co., Elizabethport
GETZOFF, Edward M., Assistant Mechanical Engineer, Singer Manufacturing Co., Elizabethport
HALPIN, ZACHARIAH P., Rate Adjuster, Edison Phonograph Works, Orange
KAIER, RICHARD, Assistant Mechanical Engineer, Singer Mfg. Co., Elizabethport
KIRGAN, JOHN F., Engineering Department, Ingersoll Rand Co., Phillipsburg
MCELRATH, WILLIAM W., JR., President, Turbo Motor Co., Inc., Trenton
PETERSON, ERIC G., South Orange
POTTERTON, GEORGE G., Assistant Chief Engineer, Weidmann Silk Dyeing Co., Paterson
QUIGG, EDWARD A., Assistant Foreman, Crucible Steel Co., Ordnance Department, Harrison
ROTHERHAM, GEORGE G., Designing Engineer, Barber Asphalt Paving Co., Maurer
SAVOYE, CHARLES U., Apprentice Engineer, Babcock & Wilcox Co., Bayonne
SCHOTT, PETER S., Chief Engineer, The Roessler & Hasslacher Chemical Co., Perth Amboy
SOMERVILLE, WM. IRVING, Chief Draftsman, General Equipment Co., Paterson
STRICKLER, ALFRED B., Assistant Mechanical Engineer, Singer Mfg. Co., Elizabeth
WILMER, PHILIP G., Assistant Chief Draftsman, American Lead Pencil Co., Hoboken

New York

ALEXANDER, RALPH L., Instructor, Rensselaer Polytechnic Institute, Troy
ALLEN, LEROY B., Construction Engineer, Air Reduction Co., New York
BEAN, HOWARD S., Chief New York Branch, U. S. Bureau of Standards, New York
BROADWIN, SAMPSON, Mechanical Engineer, Ainslie Knitting Machine Co., Brooklyn
BULL, WILLIAM C., Mechanical Engineer, Ordnance Department, New York
BURLINGHAM, WILLIAM, Vice-President, Adams, Lowell, Burlingham, Inc., New York
BOWDEN, JOHN H., Engineer, W. R. Grace & Co., New York
CALDEN, GEORGE W., Engineer, Akerlund & Semmes, Inc., New York
CHEER, GEORGE, Ensign, U. S. S., Fresno, New York
CLEMENT, WALTER J., The Bossert Corp., Utica
CUNERTY, THOMAS J., Assistant Manager, Shewan, Tomes & Co., New York
DAVIS, RALPH C., Assisting Production Manager, The Gleason Works, Rochester
DECOUTOULY, GUSTAVE C., General Direction of the French Services in U. S. A., New York
DEJONG, HAROLD, Engineer & Designer, W. S. Dolg, Inc., Brooklyn
DOWLING, LAURENCE, Assistant Engineer, American Sugar Refining Co., New York
FRIEDLI, FREDERICK C., Tool Designer, Willy-Morrow Co., Elmira
GARRETT, B. A., Designing Engineer, General Electric Co., Schenectady
GLIDDEN, EVERETT G., Supervising Foreman D. C. & D. C. M. Drafting, General Electric Co., Schenectady
GRAY, G. FRANCIS, Engineer in Charge Maintenance Division, National Aniline & Chemical Co., New York
HAAS, SAMUEL G., Engineer, Kerr Turbine Co., Wellesville
HAVER, CLINTON E., Chief Engineer, Willard Case & Co., New York
HENSE, JOHN A., Sales Engineer, Edward J. Smith, New York
HOUSE, PAUL, Assistant Engineer Appraisals, American Sugar Refining Co., New York
HOUSTON, L. W., Assistant Superintendent, Ludlow Valve Manufacturing Co., Troy
HOWLETT, CHARLES A. S., General Sales Manager, Divine Brothers Co., Utica
HUMPHREY, O. S., Captain, Army Inspection of Ordnance, New York
IMMEDIATO, GERARDO, Engineering Examiner, Municipal Civil Service Commission, New York
JOHNSON, ALFRED V., Assistant Superintendent Engineer, Cunard Steam Ship Co., New York
KENDALL, HOWARD C., Power Plant Engineer, American Trading Co., New York
KING, MARCELLO A., Chief Draftsman Land

Turbine Dept., Kerr Turbine Co., Wellsville
KRATZMAN, EMIL A., Purchasing Engineer, Foamite Firefoam Co., New York
LEWIS, DEMPSTER C., Engineer Officer, Utica Gas & Electric Co., Utica
LIND, THEODOR J., Chief Engineer, H. B. Dempsey, Furnace Co., New York
LOTZ, RALPH W., Machine Designer, Ford Instrument Co., New York
LUNDELL, GEORGE A. E., Engineer, Western Electric Co., Inc., New York
MARTIN, FRANCIS D., Sales Engineer, Frontier Chuch & Tool Co., Buffalo
MERWIN, HARRY H., Chief Designer, Ford Instrument Co., New York
MESSLER, CLINTON S., Chief Engineer, Green Fuel Economizer Co., Beacon
MOLONY, JAMES E., Designing Engineer, General Electric Co., Schenectady
MOSHER, CHARLES D., Consulting Engineer, New York
MULLINS, EDWARD E., Mechanical Engineer, Sinclair Cuba Oil Co., New York
NESTLER, HOWARD, Assistant Engineer of Tests, Navy Yard, Brooklyn
NISBET, ARCHIBALD W., Engineer of Power Stations, Schenectady
OSTLUND, BROR T. O., Engineer, Akerlund & Semmes, Inc., New York
PATTERSON, LAURENCE S., Member of Staff of Valuation Engineer, Vice President office, Western Union Telegram Co., New York
POMEROY, GLENDON M., Engineer, United Aircraft Engineering Corp., New York
POST, ROBERT C., Secretary, Post & McCord, New York
RICHMOND, J., General Manager, Potdevin Machine Co., Brooklyn
ROBINSON, DWIGHT P., President, Dwight P. Robinson & Co., Inc., New York
SCHWAB, ALVIN J., Mechanical Engineer, America-Europe Exchange Corp., New York
SEBALD, LESLIE E., Engineering Department, Griscom-Russell Co., New York
SEITZ, CHARLES, General Foreman, The Bossert Corp., Utica
SHEPARD, FREDERICK S., Assistant Superintendent, Standard Oil Co., of N. Y., Brooklyn
SIMMONDS, EDGAR R., Assistant Material Inspector & Surveyor, Bureau Veritas, New York
SPIRO, WALTER J., Treasurer & General Manager, C. Spiro Mfg. Co., New York
STERLING, LEROY P., Technical Assistant, Lidgerwood Manufacturing Co., Brooklyn
SWIFT, HERBERT D., Production Routine Engineer, National Conduit & Cable Co., Hastings-on-Hudson
TAYLOR, NATHANIEL G., Mechanical Engineer, Lidgerwood Manufacturing Co., Brooklyn
TOWNSEND, CHARLES H., Chief Engineer, Raisler Sprinkler Co., New York
TURNER, HAROLD DEW., American Locomotive Co., Maintenance Machine Design, Schenectady
VAN WINKLE, ERNEST C., Assistant Engineer, Chile Exploration Co., New York
WISE, ALFRED S., Locomotive Salesman, The Baldwin Locomotive Works, New York
WITHERBEE, REX G., Plant Architect & Engineer, Utica Steam & Mohawk Valley Cotton Mills, Utica
YORDON, JOHN C., Assistant General Manager, Laminated Shim Co., New York
ZIMMERMAN, CARL D., Efficiency Engineer, Buffalo General Electric Co., Buffalo

North Carolina

HOSMER, ASA, Inspector for Factory Insurance Association, Charlotte

Ohio

ALBERTS, JOHN C., Sales Engineer, Cleveland Osborn Manufacturing Co., Inc., Cleveland
CONROY, THOMAS M., Assistant Superintendent, The Willys-Overland Co., Toledo
DAGGETT, WALTER E., Machine Designer, Cleveland Osborn Manufacturing Co., Cleveland
DAVISON, VERGIL A., Sales Manager, Cincinnati Ball Crank Co., Cincinnati
DMYTROW, NESTOR, JR., Assistant Mechanical Engineer, Bailey Meter Co. Cleveland
DOBSON, ARTHUR A., Routine Engineer, Aultman & Taylor Machinery Co., Mansfield
DOKE, GEORGE E., Assistant Engineer of Tests, New York Central Laboratory, Collinwood
EMERY, RAYMOND W., Designer, The Warner & Swasey Co., Cleveland
EMORY, JOHN B., Assistant Superintendent, The Morgan Engineering Co., Alliance
ERMELING, LEWIS B., Sales Department, Upson Nut Co., Cleveland
GEBHART, HENRY, Secretary & General Manager, The Oakwood Street Railway Co., Dayton
GETZ, CHARLES H., Industrial Engineer, E. M. Chace, Cincinnati
GREENLEAF, ROBERT P., Mechanical Engineer, Cleveland
HALSEY, ROY, Designer of Machinery, B. F. Goodrich Co., Akron
HAMMOND, HAROLD M., Mechanical Engineer, Bailey Meter Co., Cleveland
HAZELTON, CHARLES H., Works Engineer, The National Carbon Co., Inc., Cleveland
KNEBEL, ARTHUR H., Draftsman, Walter G. Kranz, Cincinnati
KOEHLER, CHRISTOPHER L., Draftsman, The Alvey-Ferguson Co., Cincinnati
LANGHAAR, LOUIS, Machine Designer, Cincinnati Milling Machine Co., Cincinnati
MCCARTY, WILLIAM F., Chief Engineer, The Defiance Machine Works, Defiance
MARSH, JOHN M., Mechanical Engineer, Hydraulic Steelcraft Co., Cleveland
MEEHAN, PAUL F., Manager, Ironton Boiler Works, Ironton
MERCER, LEONARD V., Superintendent, Monarch Manufacturing Co., Bloomdale
MORGAN, WILLIAM J., Research Engineer, Dayton Engineering Laboratories Co., Dayton
NICANDER, AXEL H., Designing Engineer, A. G. McKee & Co., Cleveland
NILSSON, CARL R., Organizer & Systematizer, Warner & Swasey Co., Cleveland
NOCKA, ALFRED J., Bodenstein & Surmann, Architects & Engineers, Cincinnati
PRIEBE, CEDRIC J., Planning & Efficiency Work, The U. S. Playing Card Co., Norwood
REEVE, FREDERIC J., Captain, Personnel Manager, Cincinnati District Ordnance Office, Cincinnati
REINARTZ, FREDERICK L., Superintendent, Open Hearth Department, American Rolling Mill Co., Middletown
RESEK, J. VERNE, Draftsman, Cleveland Metal Products Co., Cleveland
RITTER, JACOB J., Superintendent, The W. B. Marvin Manufacturing Co., Urbana
ROCKHOLD, KENNETH E., Mechanical Engineer, Tri-State Eengineering Co., Zanesville
ROEHM, ERWIN G., Engineer on Time Study, Cincinnati Milling Machine Co., Cincinnati
ROGERS, A. CARLE, Superintendent, Heating, Toledo Railways & Light Co., Toledo
RUSH, J. LEONARD, Toolmaker, Firestone Tire & Rubber Co., Akron
SCHELLMANN, ARTHUR, Chief Engineer, Automatic Sprinkler Co. of America, Youngstown
SCHWARTZ, HARRY A., Assistant Engineer, Defiance Machine Works, Defiance
SLATER, ELMER C., Squad Foreman, Engineering Department, Jeffrey Manufacturing Co., Columbus
SMITH, JAMES M., Committee on Materials & Equipment Cincinnati District, Ordnance Office, U. S. A., Cincinnati
SMITH, LELAND H., Mechanical Engineer, Smith Gas Engineering Co., Dayton
SMITH, WILLIAM E., Chief Draftsman, The Defiance Machine Works, Defiance
TEROW, LEE R., Time Setter, Triumph Ice Machine Co., Cincinnati
UHLEIN, H. CALMER, Planning, The Cincinnati Milling Machine Co., Cincinnati
WILCOX, CLARENCE J., Engineer, Toledo Bridge & Crane Co., Toledo
WOLSDORF, HENRY A., Mechanical Engineer, The Cincinnati Milling Machine Co., Oakley
ZUMBERG, JOSEPH J., Assistant Chief Draftsman, Cincinnati Milling Machine Co., Cincinnati

Oklahoma

DONOVAN, DANIEL E., Secretary, Reinhardt & Donovan Co., Oklahoma City

Oregon

TURNER, LLOYD R., Assistant Superintendent, Machinery Department, Columbia River Shipbuilding Corp., Portland

Pennsylvania

ALLEY, VERNON F., Sales Engineer, Chicago Pneumatic Tool Co., Philadelphia
DUDLEY, Clarence L., Steam Engineer, Jones & Laughlin Steel Co., Woodlawn
ECCLESTON, ROBERT C., Assistant Sales Manager, Ridgway Dynamo & Engine Co., Ridgway
ELERS, KARL F., Mechanical Engineer, Valley Forging Co., Verona
FLEMING, THOMAS, JR., Member of Firm, Chester & Fleming, Engineers, Pittsburgh
FORESMAN, ROBERT A., Chief Engineer, Stoker Department, Westinghouse Electric & Manufacturing Co., East Pittsburg
GILLING, ETHELBERT N., Engineer, Hyde Machinery Department, United Engineering & Foundry Co., Pittsburgh
GREIG, GUILDFORD, General Superintendent, Erie City Iron Works, Erie
HART, EDWIN J., President & Chief Engineer, Reliance Engineering Co., Philadelphia
HERTZLER, SAMUEL P., Mechanical Engineer, B. Floersheim & Co., Pittsburgh
HOLLERITH, HERMAN, JR., Aeronautical Mechanical Engineer, Naval Aircraft Factory, Philadelphia
JOHNSON, FRED V., Construction Engineer, Tioga Steel & Iron Co., Philadelphia
JOHNSTON, WILLIAM S., Inspector of Aeroplanes, Naval Aircraft Factory, Philadelphia
JONES, MALCOLM S., District Manager, Sun Co., Philadelphia
KNEEN, ARTHUR H., General Superintendent, Operating Department, American Pipe & Construction Co., Philadelphia
LANG, WALTER B., Assistant Superintendent, Manufacturing Department, Naval Aircraft Factory, Philadelphia
LEVERICH, JEROME W., General Superintendent, Scranton Bolt & Nut Co., Scranton
LEVINE, HERMAN, 1st Lieutenant, Ordnance Department, U. S. A., Philadelphia District Ordnance Salvage Board, Philadelphia
LIPPINCOTT, OLIVER C., Sales Manager, Union Petroleum Co., Philadelphia
LUCAS, JONATHAN, Plant Engineer, Schmidt & Ault Paper Co., York
MANWARING, HOWARD S., Plant Engineer, U. S. Radiator Corp., West Newton
MILLER, HAROLD L., Technical Assistant, American International Shipbuilding Corp., Hog Island
MORRIS, HARRY T., Metallurgical Engineer, Bethlehem Steel Co., Bethlehem
MUMFORD, ALBERT R., Assistant Fuel Engineer, U. S. Bureau of Mines, Pittsburgh
PLAPP, ELMER B., Test Engineer, Duquesne Light Co., Pittsburgh
RICHARDSON, Percy, Mechanical Engineer & Secretary, Osborn Machine Co., Du Bois
SAGENDORPH, LLOYD A., Vice President, Pennsylvania Metal Co., Philadelphia
SAUTER, CONRAD J., Sales Engineer, Otis Elevator Co., Philadelphia
STUMP, HORACE E., Assistant Field Engineer, N. J. Zinc Co., Palmerton
TALLMAN, WILLIAM S., Superintendent, Central Tube Co., Ambridge
WHITE, WILLIAM M., Mechanical Engineer, American Gas Co., Philadelphia
WHITTLESEY, FEDERAL E., Manager, Raymond Manufacturing Co., Ltd., Corry
WOLF, W. DALE, Employment & Service Manager, Miller Lock Co., Philadelphia
WOLFE, JAY A., Aero Draftsman, Naval Aircraft Factory, Philadelphia

Rhode Island

HARRINGTON, EARL, Engineer, Manufacturers Mutual Fire Insurance Co., Providence

South Carolina

CHAPMAN, ROBERT H., Assistant Steam Power Engineer, J. E. Sirrine, Mill Engineer & Architect, Greenville

Tennessee

ROBERTS, MARTIN S., JR., Partner, Freeland, Roberts & Co., Nashville

Texas

BLANTON, BURT C., Inspection Engineer, Wood Appraisal Co., Dallas
GRANGER, GORDON T., Superintendent, Eastland Oil & Refining Co., Dallas
KEIL, LEWIS E., Chief Draftsman, Texas & Pacific R. R., Marshall
KISNER, FRED R., Engineer, Texas Pacific Railway Co., Ft. Worth
RILEY, WELLS L., Engineer, Ingersoll Rand Co., of Texas, El Paso
SCHMIDT, ELMER F. E., Chief Mechanical Engineer, Lone Star Gas Co., Dallas
VANDERVOORT, L. A., General Superintendent, Chestnut & Smith, Texas Division, Rangor
WILLIAMSON, PAUL B., Consulting Engineer, Williamson-La Fortune Oil Corp., San Antonio

Virginia

HOWELL, EDWARD N., Plant Draftsman, Portsmouth, Cotton Oil Refining Corp., Portsmouth
REYNOLDS, H. WALLACE, Mechanical Inspector N. & W. R. R., Roanoke
SMITH, A. T., Engineer, Newport News Shipbuilding & Dry Docks Co., Richmond

Washington

EWING, GEORGE H., Manager, Pacific Northwest Inspection Bureau, Seattle
SCHMIDT, KARL, Inspector of Naval Aircraft Bureau C & R Ensign U. S. N. R. F. C., Navy Office, c-o Boeing Airplane Co., Seattle

Wisconsin

GIBERT, ALFRED L., Assistant Engineer, Department of Engineering, Power Plant Division, Madison
PARKINSON, HAROLD M., Draftsman, Mechanical Department, Chicago, Milwaukee & St. Paul Railway Co., Milwaukee
SORENSON, JAMES, Metallurgical Engineer, F. W. D. Auto Co., Clintonville
STROEBEL, ARTHUR W., Assistant Superintendent, The American Appraisal Co., Milwaukee
TRESTER, HERAULT A., Chief Engineer, Metal Forme Corp., Milwaukee

Wyoming

KOCH, BRUNO F., Mechanical Draftsman, Shop Engineer, Chicago Burlington & Quincy R. R. Co., Sheridan

Canada

ROSS-ROSS, DONALD DE C., Assistant Cable Engineer, Northern Electric Co., Montreal
SMITH, ALLAN J., Master Mechanic & Chief Engineer, Belmont Surf Inlet Mines, Ltd., Surf Inlet, B. C.

England

PARKER, FREDERICK T., Major, Royal Marine Engineers, Chief Mechanical & Electrical Engineer, Civil Engineer-in-Chief's Department, London

Hawaii

TERRY, SEYMOUR, Mechanical Engineer, Honolulu Iron Works, Honolulu

Mexico

MOORE, HENRY, Engineer, Cia re Real del Monte y Pachuca, Hidalgo

Philippine Islands

THOMPSON, LEROY H., Mechanical & Electrical Engineer, Bureau of Public Works, Manila

South America

RICHARDSON, CHARLES B., Erecting Oil Mill & Refinery, E. Tude & Co., Bahi, Brazil

CHANGE OF GRADING.
PROMOTION FROM ASSOCIATE MEMBER.

Delaware

CREWSON, G. G., Mechanical Engineer, E. I. DuPont de Nemours Co., Wilmington

District of Columbia

BLEE, HARRY H., Captain, Air Service U. S. A., Washington

Massachusetts

ROBBINS, JOHN L., Mechanical Engineer, Robbins Ganwell & Co., Pittsfield

Minnesota

DEVLIEG, RAY A., Methods Engineer, Pan Motor Co., St. Cloud

New York

FELL, HUGH, Chief Engineer, Dry Milk Co. & Associated Companies, New York
LEAHY, FRANCIS W., Senior Performance Engineer, U. S. Shipping Board, Emergency Fleet Corp., New York
MACY, RALPH G., Construction Engineer, Walter Kidde Co., New York

Pennsylvania

HOLMGREN, F. C., Manager, The Philadelphia Trailmobile Co., Philadelphia

New Mexico

BARNES, ARTHUR F., Professor of Mechanical Engineering & Dean of Engineering, New Mexico College of Agriculture & Mechanic Arts, State College

PROMOTION FROM JUNIOR

Maryland

WILLIAMS, SILAS, Captain, Ordnance Department, U. S. A., Aberdeen Proving Ground, Aberdeen

Michigan

HIRSHFELD, CLARENCE F., Chief of Research Department, The Detroit Edison Co., Detroit
KEELER, HUGH E., Instructor in Mechanical Engineering, University of Michigan, Ann Arbor

New Jersey

HAGEMANN, GEORGE E., Mechanical Engineer & Draftsman, Warren Foundry & Machine Co., Phillipsburg
RUTTER, JOHN A., Trenton (Reinstatement).

New York

PATTERSON, JAMES C., Sales Engineer, Foamite Firefoam Co., New York

Ohio

MISCH, ARTHUR A., Mechanical Engineer, McKinney Steel Co., Cleveland

Pennsylvania

BILLMYER, CARROLL D., Designer & Draftsman, Atlas Portland Cement Co., Northampton

Wisconsin

THORP, JOEL R., Mechanical Engineer, Clum Manufacturing Co., Milwaukee

SUMMARY

New Applications	341
CHANGE OF GRADING:	
Promotion from Associate Member	9
Promotion from Junior	9
Total	359

SUMMARY SHOWING AVERAGE AGE AND POSITIONS OF APPLICANTS ON BALLOT CLOSING AUGUST 12, 1919

Average age of applicants:	
Members	40
Associates	37
Associate Members	32
Juniors	25
Chemical Engineer	1
Chief Engineers	9
Asst. Chief Engineer	1
Construction Engineer	1
Consulting Engineers	2
Designers	5
Draftsman	4
Chief Draftsman	2
Efficiency Engineers	2
Executives (Pres., Vice-Pres., Secy., Treas., Mgrs.)	20
Industrial Engineers	2
Master Mechanic	2
Mechanical Engineers	121
Asst. Mechanical Engineers	3
Production Engineers	3
Professors	1
Asst. Professor	1
Research Engineers	2
Safety Engineers	2
Sales Engineers	3
Sales Managers	2
Steam Engineer	1
Superintendents	6
Asst. Superintendents	2
Supervisor	1
Works Manager	1
Miscellaneous	25

UNITED STATES GOVERNMENT SERVICE

Colonel	1
Captain	1
1st Lieutenant	1
Ensign	1

In Two Sections—Section Two

Volume 41 Number 10

MECHANICAL ENGINEERING

THE JOURNAL OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

October, 1919

Society Affairs

A Record of the Current Activities of the Society, Its Members, Council, Committees, Sections and Student Branches; and Affairs of Interest to the Membership

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
29 West 39th Street, New York

SOCIETY AFFAIRS

Affairs of Interest to the Membership—Secretary's Letter—New Policy of Society Awards—Among the Local Sections—Important Student Branch Recommendations—Addresses of Members Required—Employment Bulletin—Candidates for Membership

The Secretary's Letter

"THIS Society is not great for what it does, but for what it helps others to do." These were the words of Mr. Ambrose Swasey, Honorary Member and Past-President of the Society, on the occasion of his last visit to the rooms of the Society. Whenever he is in the vicinity of New York, Mr. Swasey never fails to come in and give us all a kindly greeting.

This is the spirit of the whole Society—to render service to others. It is the spirit that actuates an engineer to become a member, so that through the Society he may in some manner contribute his talents to the advancement of the engineering profession. Mr. Swasey, and other good friends, usually ask, "What is new?" indicating their ever-readiness to serve.

The news this month is that Mr. Charles LeMaistre, Secretary of the British Engineering Standards Association, is in the United States at the invitation of the American Engineering Standards Committee; and the latter organization, joined by the officials of the Engineering Societies and representatives of the departments of the Government, the commercial world and the Navy, tendered Mr. LeMaistre a complimentary dinner. On this occasion he gave an address on Standardization, coupled with a statement of the work of the British Engineering Standards Association. I feel that the Engineering Societies can contribute directly to the stabilizing of the world in no better way than by standardization of product. Further, that in order for the United States to maintain its industrial supremacy against the sharp competition which is sure eventually to come, we must standardize both method and product so that we will still, with highest wages, be able to produce at lowest cost.

Another matter of interest was the reception, attended by 1200, to Mr. Herbert Hoover who recently arrived from abroad, an account of which appears in this number. This was absolutely non-political and solely under the auspices of the American Institute of Mining and Metallurgical Engineers to a fellow engineer who has brought great credit to the profession by his most efficient and unselfish devotion to the cause of humanity.

One of the gratifying developments of the Society's work is the increase in use of the Library by the members who live at a distance. The Library service has doubled and even trebled during the last few years, and we are prepared to render still greater service by the re-cataloguing which is now in progress.

We are developing still further both the quality and quantity of the indexing in the Engineering Index. One member stated that he regarded this compilation as a dictionary and consulted it continuously. We want every member to get the full benefit of the extraordinary service which we are trying to render; and inasmuch as it is being conducted with a large staff and at great expense, we are especially grateful for any suggestion as to how the service can be improved.

One of the new developments is the membership of the Society in the National Industrial Conference Board. The President of the United States addressed this Board first in his letter calling for a Labor Conference in Washington on the 6th of October. The Society intends, through its Council and its representatives on the National Industrial Conference Board, to assume its responsibilities and obligations in helping to solve the problems of industry which are just as much essential to successful production as proper designing and are strictly within the engineering purview of the Society. In order that the whole membership may get the benefit of the remarkable publications of the committees of this Board, a special department will shortly be inaugurated in MECHANICAL ENGINEERING. So important are these publications in regard to the research work of the National Industrial Conference Board that no one concerned in industry can afford not to read them and to post himself on the facts determined.

The President has devoted an extraordinary amount of attention to reconstituting and appointing new committees for conducting the Society's work and has been grateful for the offers of assistance which he has received from the members. He is, however, still hopeful that more members will continue to send in their names as available for committee appointments as there are several pieces of important work yet to be undertaken.

CALVIN W. RICE,
Secretary.

New Policy on Society Awards

THE Council has had under consideration for some time the advisability of extending the policy inaugurated in the revision of the Junior and Student prizes for meritorious papers. The granting of awards is a common practice with learned societies and furnishes a legitimate and valuable means of encouraging production of good work.

With the view of formulating a definite policy which the Society might well pursue in this connection, the Council charged the special Committee on Relations with Colleges to practices of other societies and to make recommendations. This the Committee did and presented its report to the Council and the report was ordered printed. The recommendations follow:

TO THE COUNCIL OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS,

GENTLEMEN:

The Committee on Relations with Colleges, acting as a special Committee on Awards, desires to place before you the following brief statement accompanied by certain recommendations for the purpose of offering a more consistent and ample recognition of service to the profession and to the country by engineers, especially by those who are members of our Society.

At present we have several awards.

The first and most important is the Honorary Membership voted to eminent engineers for service to the profession.

The second is Life Membership which has occasionally been voted for excellence of work.

The third is a Junior Prize awarded for the best paper by a junior member of the Society.

The fourth is in the form of prizes for student branch members for the recognition of good papers.

There is a possible fifth in a medal to be awarded from the income of a bequest by Rear Admiral George W. Melville, formerly president of our Society. The dies for this have not been provided and it will require some years to accumulate from the income sufficient to make this medal available.

The Society also shares in the award of the John Fritz Medal by the appointment of four members of a board having administration of the fund and the medal.

It will be observed that these are not very systematic and that they do not cover the whole subject of awards and medals for the encouragement of good work as fully as our Society would approve. Members have suggested from time to time that suitable recognition for service to the profession and to the industries of the country would offer greater inducement towards activity and would thus be fruitful of benefit to modern society. We have constantly laid stress on the increase of membership as a means towards enlarging our field and our service to the public and of recent years much effort has been expended through our Committee on the Increase of Membership so that the numbers have almost doubled during this great world crisis. Through this increase of membership, through a broader policy as to business, and as to human relations of our Society with the whole country, the income of the Society has grown enough to make it pre-eminent in its resources.

The question then is very properly raised: Are we doing all that is possible both for the benefit of our members and towards a greater stimulus to good work? Should not some of the increased annual income be expended towards the production of valuable papers submitted at the conventions, towards the encouragement of student ac-

tivity, towards better service on the part of all engineers and towards the broadening out of our whole profession?

It is common experience that the income of all societies and institutions fluctuates from year to year and that while we are prosperous today changes may come to reduce our income and render us less able to carry out expensive awards. Consequently, it would be better to have the recognition in the nature of medals or awards provided by gift and bequest to the Society. Some of the foreign societies have paid considerable attention to this form of benefaction. Such awards should not be expensive as it is the recognition far more than the actual intrinsic value of anything given to a member that renders it acceptable and stimulating. It would be possible occasionally to set aside a fund, the income from which would be devoted to some award named in honor of a distinguished member of our Society. Such action, and the gifts that might follow a well recognized system of award, would gradually accumulate the endowment funds for all such purposes.

Our association has always been an education and a friendship Society and the chief thought of the founders seems to have been the exchange of information for the purpose of enabling the members to do their work better. It is perfectly proper that there should be the thought of personal advancement as well as of benefit to the public in the mind of all who join. We cannot ask members to come into the Society simply on the basis of what they can do for others unless there is some reward. As young men they must make a living and it is right that they should be assisted, both by friendly help in obtaining employment and by cordial recognition for good service rendered to the profession. We have at the present time benefit from papers and from the wider acquaintance that springs from attending the annual meetings.

In the first place, there is MECHANICAL ENGINEERING, the Journal which has become an important engineering periodical.

In the second place, there is the Year Book, containing the names and addresses of not less than 10,000 men interested in mechanical engineering.

In the third place, THE ENGINEERING INDEX, which is issued annually, gives brief descriptive data on all important articles appearing in the technical press.

In the fourth place, a Condensed Catalogue of the mechanical equipment in the United States is supplied to every member.

In the fifth place, the library in the Engineering Building is brought within reach of every engineer, wherever he may be, through the service bureau that will search and translate from original papers anything desired by the members.

In the sixth place, the Society acts as an employment office for all members who are seeking professional opportunities. It has rendered a large service in this respect.

In the seventh place, the Society rooms are freely used as meeting places for members who go to New York.

This is no attempt to list all the benefits to members who join the Society. They will always get their principal gain through increased acquaintance and through the outlook afforded by the large meetings and also through the information given in the published papers. Up to this time, however, there has been comparatively little interest in recognizing through awards and medals the achievements of engineers.

The desire for approval on the part of his colleagues is one of the strongest motives that can actuate any human being. It is more powerful, even, than the instinct of self-preservation because the individual who gains in a large measure the respect of his fellowmen is stimulated to wider service while he who has lost their respect is broken down both professionally and morally. The finest title to fame comes from the approval of one's own profession and from the fellow members of a great society. Those who have a professional knowledge of the work that we have done have the right to give us the larger encouragement to better work. The Council of The American Society of Mechanical Engineers has done well to raise this whole question, especially during this reconstruction period when we are all hoping the world is going back to a condition of permanent peace under which a better day will dawn. Philosophic writers have called attention many times to the plain question as to how humanity may find in time of peace that developing struggle in which all sound, healthy men delight to engage, thereby building up the mental and physical strength of a future generation and thereby promoting the many virtues that are found in war. It is a certain generous spirit of emulation that we are seeking to promote and with it those virtues, sometimes called the savage virtues, that grow upon the battlefield, truth and loyalty, devotion to a cause and the willingness to sacrifice life, even to the extent of throwing one's body in the way of a despoiler of ideals. We want, in our Society, these savage virtues and we want our members to know that we recognize them when we see them.

At the present time a member finds his chief satisfaction in the work done and in the commendation of a few friends. Even so striking an illustration of excellent service as that of the Boiler Code Committee has up to this time had no form of public encouragement from our Council or our Society. We have approved the work of the committee and we have invariably assisted them in their interpretation, but notwithstanding the fact that many states have by legislative enactment recognized the value of this committee's work, we of the Society have made little or no public acknowledgement. The war has undoubtedly stimulated active thought in this direction. The service of our members in the field and in the training camps has caused us to think more acutely on the whole subject of recognition for good work. Many of our members have gone into service at a financial and physical sacrifice to themselves in the hope of being able to do their full share towards bringing victory to our country. The time is ripe then for generous recognition to men who have served both in peace and in war.

On December 3 it was voted by the Council of The American Society of Mechanical Engineers to approve the establishment of some order of merit and to appoint a committee to study the whole subject towards making a better society. In the meantime the Committee on Student Branches has been changed to be called the Committee on Relations with Colleges and the matter was committed to them as a special committee. This simply means that the Committee has been directed to make a study of the subject and make a full report on the whole general question as to encouragement to better work in our Society and to suggest to the Council some definite action in the shape of awards and encouragements to members of the Society. While this movement seems like breaking new ground, as a matter of fact it is following along behind many societies. In the appendix of this report there will be found information with regard to awards, in part taken from a book published by the Carnegie Institution in Washington, and in part from the year books of American societies. The by-laws are given for some awards to assist in a better statement for our own Society.

It is interesting to note that some of the foreign societies have gone very much farther than any American societies, except perhaps, the Franklin Institute, towards endowments for profession recognition. The Institute of Civil Engineers of Great Britain has endowment funds which amount to £32,353, presented to them through bequests and gifts. Every fund is named and the purpose for which it is given, is specified. The Institute of Electrical Engineers of Great Britain have given, in premiums and scholarships during one year, £680. The Institution of Mechanical Engineers of Great Britain has an endowment given by members and friends of £3,695. The Society of Civil Engineers of France has an endowment exceeding 300,000 francs for awards and other purposes, to stimulate activity in their profession. All of the above amounts can be accepted only as approximate as they represent the practice of a few years ago. They are so far ahead of American societies, however, that the principle established by them can be accepted.

There is a great difference of practice among different societies and in order that the Council may deal with the whole matter intelligently, the by-laws of societies are given in many cases. Attention may well be called to the growing disposition on the part of scientific societies and manufacturers to assist by endowment the establishment of needed funds for the use of societies. Money has been given and all kinds of conditions have been specified for the use of the income.

The most important award in this country is the John Fritz Medal established by the professional associates and friends of John Fritz on August 21, 1902, to perpetuate his memory. The fund is distinctly the gift of a number of men and it is administered by the four founder societies holding the Engineering Societies Building.

The oldest award is probably that given by the American Academy of Arts and Science, the Rumford Award, which had its origin in a gift by Count Rumford. The endowment is $5,000 and the income is to be used as a suitable premium for discoveries or improvements in heat and light.

It is not necessary here to go into details as they are given in the list of societies that follows as an appendix to this short statement. The whole subject of endowments for awards and other purposes and the votes for stimulating activity and a wider understanding in the profession may be classified along certain lines.

1 Honorary Membership voted by governing bodies to men of great distinction in the profession, being in a sense similar to the honorary degree awarded by colleges and universities.

2 Life Membership voted by governing bodies or by letter ballot of an entire society for excellent contribution to the literature of the society. This is customarily given only to members who, by their activity, assist in the development of science. The by-laws under which this award is voted in some cases restrict it to those who have not yet established their reputation, presumably on the principle of encouraging younger men to come forward.

3 Medals voted for excellent contribution of some kind whether to the literature of the society or to the applications of science. These are given to members and non-members of societies and may cover any department.

4 Cash prizes voted for exceptional work in science or as a recognition of excellent progress in some special direction by students in colleges. Such prizes sometimes accompany medals or life membership for excellent contributions to literature.

5 Cash awards voted for the conduct of research and given to men of exceptional promise, or to men who have shown by research already partly completed the value of continuing their work and bringing it to a successful conclusion.

6 Fellowship voted to enable a student to continue his study or to travel in the interest of his branch of the profession. This is

usually given to men who have graduated from a college or technical school and is looked upon as graduate work for which a student must establish his entire fitness to the satisfaction of a board.

7 Scholarships awarded to students in undergraduate departments of colleges. These scholarships may be given to young men of exceptional promise for special theses along any line connected with the engineering profession, or for first-rate work along some other lines in colleges. They amount to cash prizes.

8 Honorable mention by some governing bodies for contributions to the literature or to the applications of science.

9 Some special kind of button or insignia that can be worn by men who have been commended by the Society or by student members who have joined one of the college branches.

10 Assistance out of a benevolent fund raised from the whole membership to take care of our brothers in distress or of their families. This does not exactly belong to the type of award under consideration but it should be mentioned here as a means of calling attention to a direction in which the British societies excel.

11 A recognition of efficient service in the education of young men for the profession by the establishment of lectureships, possibly travel lectureships, for the benefit of the profession. A good example of this is found in the James Forrest Lecture and Medal Fund of the Institution of Civil Engineers of Great Britain.

In taking up the establishment of some awards by our Society certain fundamental ideas should be kept in mind. The main purpose of such recognition is to establish a cordial air of good fellowship on the part of all members of the Society towards those who have done work out of the ordinary. Every member who presents a paper should know that it is going to be part of his record as an engineer and that where high merit is exhibited, it will obtain speedy recognition from his colleagues. That is the only stimulus that we can give for good papers. Besides this every engineer in our Society who is engaged in manufacturing should know that any marked improvement in the arts would also have quick recognition by the entire Society. There are two ideas that accompany every award. One is the encouragement to the profession by telling them that there is at least one place where something besides money counts. In general we must keep in mind that it is the younger men who need encouragement and consequently our awards should be recognition in some public way for the service rendered, first by men of established reputation, and second, by young men who have presented excellent papers or have opened the way to greater advances in manufacture. There ought to be prizes not open to eminent men. Any recognition voted by the Council for service to the public, to the profession, or to the Society itself should be given at one of the general meetings and should be published in the Journal. We have too great a tendency to pass over in silence the work of our colleagues, taking for granted that the work itself is a suitable reward. In that way our Society loses something, perhaps a tangible something, in its relation to the whole country. At present there is a supposition on the part of Western members that it is a New York or Eastern aggregation. Nothing could be further from the truth; nevertheless, the Council should take every opportunity to combat the belief that men remote from headquarters cannot get quite the same benefits and the same recognition, but it should be quick to call attention to the good work of any member, however remote from headquarters he may be.

The effort of President Cooley, to distribute the membership of committees over the whole country and to call into service the members who have not heretofore been available, can be strengthened and reinforced by suitable recognition to any man who has served eminently. The membership in a local section should be encouraged to call attention to the work of engineers in their section and to nominate for appropriate recognition the best men in their societies. It may be that in limiting the choice to only a few individuals every year, so that our awards may not become too cheap, we shall have to deny candidates suggested by sections or to postpone their consideration. Under all circumstances a committee of the society will no doubt be able to justify its action.

The two meetings where this public recognition can be given are general and the Meetings Committee should plan such interesting events definitely on the program. The general Annual Meeting in December might be limited to Honorary Membership, to Life Membership and to medals for service of very great distinction. The Spring Meeting might be set apart for recognition of the best papers of the year even to the extent of awarding Life Membership and to the award of prizes and scholarships. This is merely by way of suggestion as the important consideration about the whole business is dignified publicity.

The following recommendations are offered to the Council for action with the understanding that if they are approved, in part, or as a whole, they will be placed before the Committee on Constitution and By-Laws for elaboration into a working system.

1 Honorary Membership voted by the Council as at present in accordance with the Constitution of the Society.

2 Life Membership for the best contribution to the literature of MECHANICAL ENGINEERING to be found in the papers for one year.

3 A Medal for some notable invention or some striking improvement in connection with the industries.

4 Honorable Mention for notable contribution to engineering, either of a practical nature or in literature.

5 Scholarships or Fellowships for exceptional attainment in college work.

6 A Medal or special mention for notable work by Junior members and by students.

The administration of this whole matter should be placed in the hands of a committee for recommendation to the Council. All the sections and the individual members of the Society should have attention called to this departure of the Council from the practice in regard to awards. Any member should feel free to submit the name of an associate or member of the Society for consideration if he has rendered notable service of some kind. The local section in every state of the union should feel it part of its duty to bring before the committee full information with regard to notable achievements of any member.

(Signed) IRA N. HOLLIS, *Chairman*
JOHN R. ALLEN
J. W. ROE
GUIDO M. MARX.

Among the Local Sections

CHICAGO:

September 30. City Zoning as pertains to the requirements for residential and manufacturing districts, by Mr. Whitten, Chairman, Zoning Committee, Cleveland, O.

CLEVELAND:

September 9. All day meeting.

10.00 A. M., The Trackless Train for Moving Materials (Illustrated with motion pictures).

11.00 A. M., Engineering Problems of Cleveland's Rapid Transit Development.

2.00 P. M., Inspection trip by special train, the first over the New Rapid Transit Line, stopping at the Shaker Heights Club for luncheon.

6.00 P. M., Dinner at Hotel Cleveland. Noted Hydro-Electric Developments in Italy and South America (Illustrated), by O. M. Smart, specialist in hydro-electric engineering, detailed by the U. S. Government to investigate the recent water power progress made in the Italian Alps.

8.00 P. M. Pertinent address on a phase of the problem of capital and labor by Dr. Willis A. Moore.

September 30. The Engineer's Place in Safety Work by L. A. DeBlois, Engineer of the E. I. DuPont deNemours Company, Wilmington.

COLORADO:

September 13. Dean Charles Russ Richards, member of the Committee on Local Sections, attended an informal dinner-meeting at the Shirley Hotel, Denver.

NEW YORK:

September 17. Industrial Unrest, by Dr. Wm. M. Leiserson, formerly Chief, Division of Labor Administration, Working Conditions Service, U. S. Department of Labor.

Committee on Aims and Organization

It is just one year since announcement was first made in these columns of the appointment of a special Committee to "discuss and formulate the aims of the Society in the light of modern development and present-day thought, and to assist towards finding a method of coöperation with the rest of the engineering profession to carry out these aims." The Committee has been actively at work during this period of time and as the situation now stands, it will present its final recommendations to the Council in ample time for passage by that body for presentation to the Society as a whole at the forthcoming Annual Meeting.

Meanwhile, the other Founder Societies having had similar committees at work, and there having been appointed a Joint Committee on Development to discuss those features of the respective reports of the Committees which are of interest to all, the Joint Committee has been holding meetings and is expected to report back to each of the Societies very soon, and its report will, therefore, be received by our Society about the same time that our own Committee has its final report in shape. Therefore, at the time of the Annual Meeting our membership will have an opportunity to discuss the recommendations of our special Committee on future policy in our internal affairs and also on future policy in our relationships with the Founder Societies through the various joint activities.

Important Student Branch Recommendations

Before the war, the Society maintained active connection with a number of the leading engineering colleges throughout the country through the medium of its forty odd Student Branches; but with the changed conditions in the colleges induced by the war, this activity suffered somewhat; and to revive the activity the Council recently created a special Committee on Relations with Colleges which was requested to investigate Student Branch requirements and to recommend a policy for the conduct of Student Branch Work.

The report of the Committee was presented to the Council and was received and ordered printed in MECHANICAL ENGINEERING. The recommendations follow:

TO THE COUNCIL OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS,

GENTLEMEN:

Your Committee on Relations with Colleges begs to submit the following report and recommendations:

The ineffectiveness of our relations with colleges seems due to lack of definite program, a failure in coördination between the parent Society and the student branches, and a resultant reliance upon the initiative of a few individuals whose interest fluctuates from year to year.

While nothing should be done to disturb the present autonomy of the student branches we would recommend an addition to the By-Laws as follows:

> Each student branch shall annually elect one of its members to serve as Corresponding Secretary. He may receive a nominal remuneration and expense account from the Society. His duties shall be those ordinarily attached to such a position and in addition thereto he shall be responsible for the maintenance of records and serve as channel of communication with the parent Society.

In this way there will be established a tangible official connection through which suggestions from the Society may be made leading toward continuity of policy and interest. In pursuance of this plan a further addition to the By-Laws as follows would be desirable:

> The Society shall issue every spring a syllabus or suggestion of some one subject or subjects, for consideration for the following year.

It is understood that this is to be done merely by way of helpful advice or guidance and involves no element of dictation, but on the contrary that individual initiative on the part of the branches is to be vigorously encouraged.

At present the activities of the student branches—while no two colleges have exactly the same methods—may be grouped under the following heads:

1 To get outside lecturers on technical subjects.

2 To get outside lecturers on non-technical subjects.

3 To get salesmen or agents from manufacturers to describe their product, usually illustrating with a stereopticon.

4 To obtain lecturers on general subjects from members of the general faculty with which the engineering department is connected.

5 To encourage students to speak on their feet in public meetings (a) by giving them the periodicals and books to be reviewed orally. (b) by having the results of theses, investigations, and technical work conducted by the student, described. (c) by the delivery of brief addresses on non-technical subjects.

6 To broaden the contact with engineering by joint meetings with other branches of engineering in the student engineering society.

7 To bring students together, mainly for social purposes and for making them acquainted with the A. S. M. E. and its usefulness to them personally.

8 To teach them initiative by non-interference in the student branches, thus leaving to them all activities outside the classroom.

These are all to be commended. By way, however, of a suggested list of topics (such as contemplated under the proposed By-Law) the following may be enumerated as well worthy today of consideration by a student branch:

1 The general effect of the peace conference and the League of Nations upon the work of the engineer, especially in commercial life of the nation during the next generation.

2 The method by which war disorganizes industries and the work of reconstruction that invariably follows every war. The general reconstruction that must follow this war in all the belligerent countries.

3 Standardization for manufacture and the effect of this in forcing engineers and manufacturers to reduce the number of parts and to simplify construction of all kinds of machines. Standardization for guns and munitions.

4 Conservation of national resources including fuel, water, soil, forests, and minerals.

5 Labor and the complete readjustment of society in order that employer and employee may live together in peace. Examples of the solution of problems in different manufacturing companies.

6 The problems of transportation, national and private ownership, and the changes consequent upon improvements and rapidity of transportation.

In the judgment of your committee it is advisable that time for the activities of the student branch should be taken from the present demands upon the student so that they may not become of the nature of additional courses of study and that credit may or may not be given in accordance with the conditions that prevail in each college. Recognition should in all cases come from the parent Society since this will foster closeness of relationship. It may take the form of an extension of the present system of Student Prizes such as Certificates of Award for these papers which merit recognition even though they fail to win one of the prizes. Gift or loan scholarships may also be provided. The details of this would require knowledge of the funds available and could be worked out by the committee for later recommendation to the Council if the general idea meets with approval.

The Committee submits herewith certain recommendations for consideration and approval of the Council. It may be wise to specify that in approving these resolutions both the Council and the Committee regard them as a tentative method of working out our relations with the education of men for our profession, to be modified and extended as experience proves their effectiveness toward the purpose in view.

1 An addition to the By-Laws as follows:

Each student branch shall annually elect one of its members to serve as Corresponding Secretary. He may receive a nominal remuneration and expense account from the Society. His duties shall be those ordinarily attached to such a position and in addition thereto he shall be responsible for the maintenance of records and serve as channel of communication with the parent Society.

2 An addition to the By-Laws as follows:

The Society shall issue every spring a syllabus or suggestion of some one subject or subjects for consideration for the following year.

3 The authorization of ten scholarships, not to exceed $200.00 each, to be awarded under rules prepared and administered by the Committee on Relations with Colleges.

4 The setting aside of a fund to be invested in loans for deserving students, to be administered by the committee.

5 The authorization of the necessary expense for sending a representative of the Society to visit student branches, preferably selecting one or more members of the Committee on Relations with Colleges for this service.

6 That the Committee on Relations with Colleges be instructed to encourage co-operation among the different branches of engineering in college as well as among the different student branches in the different colleges.

7 That the Committee on Relations with Colleges be instructed to encourage the students to conduct the affairs of the branch themselves rather than to depend solely upon faculty direction or supervision.

8 That the President of the Society, either personally or through the committee, be requested to confer with the Engineering Societies, looking to co-operative effort in connection with education.

9 That the Local Sections of the society be requested to interest themselves in the student branches within their localities.

10 That the organization of student branches be left with the Committee on Relations with Colleges subject to the approval of the Council.

11 That, so far as it seems advisable and possible, the Society, through its committee, assist the student branches in obtaining from time to time a few good lecturers from the outside.

12 That a student who has done the most effective work in a student branch in his senior year may be elected to junior membership in the society upon graduation by the student branch, and that the society remit the initiation fee and dues for the first year.

13 That the present system of Student Prizes be continued and, if found possible and advisable, extended.

For the Committee.

(*Signed*) IRA N. HOLLIS,
Chairman.

Technical Men for the Consular Service

For the coming consular examinations the officials of the State Department have expressed their hope that a considerable number of technical men will take the examination. The Department recognizes that the interest of the United States will be served best if technical men are made available, through these examinations, for vacancies where their training will be of value.

Industrial engineers who passed the consular examination would be assigned to industrial centers of Europe or South America. Chemists, mining engineers, mechanical engineers, electrical engineers, etc., would be assigned to industrial centers requiring special training.

The consular examinations will be held in the late fall or early winter, but no definite date has as yet been fixed.

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications and positions listed below combine the services of the Society and of the Engineering Societies Employment Bureau, Room 1605, Engineering Societies Building.

POSITIONS AVAILABLE

Stamps should be inclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society records.

SALES ENGINEER to have executive charge and direction of sales for manufacturer of steam specialties and valves. Must have had education and experience in general engineering and past record of successful sales management; able to take care of established business and develop new connections. Position requires considerable travelling, to establish personal acquaintance with large users of steam appliances, and ability to meet consulting engineers and purchasing agents of large corporations. Would have one or more assistants as travelling representatives. Must have ability and experience in organization and direction of work but not limited to office duties. Age 35 to 45. Location New York City. R-1369.

MECHANICAL ENGINEER who has had about four years practical experience in power plant designing, installation of piping, heating and ventilating, and machine installation; must be a technical graduate. Location New York City. Salary $200 to $300. R-1395.

SALES ENGINEER; must have initiative and energy to sell a new type of tractor wheel. Work at first is in the Middle West. Salary commensurate with ability. R-1398.

SUPERINTENDENT who has had several years actual experience in the manufacture of sprockets and cranes; must be A-1 executive and be able to handle men, and to direct a force of 25 to 60 men. Imperative that he be a native born citizen and it is preferred that he be not over the age of 35. College training preferred but not necessarily essential. Location Indiana. R-1400.

SUPERINTENDENT to have charge of machine shop, erecting shop and foundry, of a plant manufacturing oil and gas burning furnaces. Location Pittsburgh, Pa.. R-1404.

STORE KEEPER OR PURCHASING AGENT capable of organizing a store room and getting records in the proper shape and out on time. Location Pittsburgh, Pa. R-1405.

MECHANICAL ENGINEER to act as chief draftsman and superintendent of outside erection. Location Pittsburgh, Pa. R-1406.

SALES MANAGER who has had a great deal of sales experience; preferably man who has practical experience in heat treatment and forging of steel. Location Pittsburgh, Pa. R-1407.

STRUCTURAL STEEL DRAFSTMAN; only men with extensive experience need apply. Several openings. Location Havana, Cuba. Salary depends on experience. New York interview. R-1409.

MECHANICAL DRAFTSMAN with experience on machinery and in the design of fixtures, gages and tools. Openings for two or three men. Location New York State. R-1412.

MECHANICAL ENGINEER AND DRAFTSMAN who has had practical shop experience with lithographic presses, and other machinery used in a large lithographic plant. Location New York State. R-1414.

DETAILER AND REFRIGERATION ENGINEER; experienced as refrigerating engineer, having operated a cold storage plant. Location New York State. R-1420.

DESIGNER experienced in heating and ventilating engineering and having some power plant and piping layout experience; must be willing to do board and field work. Location New York City. R-1421.

SUPERINTENDENT OF CUTLERY PLANT; mechanical engineer with steam experience in the manufacturing line. Location Wisconsin. R-1428.

STRUCTURAL STEEL DRAFTSMAN; must have had experience in detailing of structural steel work and must be capable of designing bridges and buildings under the direction of the office engineer. Position permanent. Location Pennsylvania. R-1434.

GRADUATE ENGINEER with few years practical experience in one of the basic industries, i. e. metal, wood, rubber or textile; must be conversant with time study work as well as various systems of remuneration, and must be capable of writing reports on industrial conditions as found during the diagnosis investigation. Good appearance is essential. Location Cleveland, Ohio. R-1437.

GRADUATE MECHANICAL, ELECTRICAL OR CIVIL ENGINEERS; preferably with one or two years of technical experience. Must be technical graduates. This position is with a large industrial corporation. Location New Jersey. R-1438.

MECHANICAL DRAFTSMAN competent to assist designing engineer. State full details as to experience, education, nationality, salary expected. Location Indiana. R-1439.

SUPERINTENDENT with general factory production experience for superintending factory manufacturing small intricate parts. Two openings. Location New York City. R-1440.

CONSTRUCTION ENGINEER experienced in building construction with general experience in mechanical and electrical engineering layouts; must be familiar with power plants, piping layouts and cables. Location Ohio. R-1444.

STRUCTURAL DRAFTSMEN with several years experience. Three openings. Location Hastings-on-Hudson, N. Y. Salary $35 to $45 per week. R-1446.

RECENT GRADUATE, as assistant to superintendent of power; technical graduate of 1918 or 1919 in mechanical engineering preferred. Location Massachusetts. R-1450.

INSTRUCTOR IN SHOP WORK; good knowledge of the fundamental operations on the common tools, to do machine work; also some knowledge of foundry, pattern making and forging. Not necessary to be technical graduate. Work will begin early in September. Location New York City. R-1453.

RECENT GRADUATES in mechanical engineering for positions in South America. Good location. Salary $125 per month. R-1456.

MECHANICAL DRAFTSMAN, must thoroughly understand machine design. To do some designing and detail work both on small and large parts and on recovering machinery. Several openings. Location New Jersey. R-1457.

EFFICIENCY ENGINEER familiar with building construction. Location Akron, Ohio. R-1458.

OFFICE MANAGER; familiar with materials, to check up blue prints, take off quantities, handle correspondence, and have general charge of engineering department work. Location Akron, Ohio. R-1460.

INSTRUCTOR IN ENGINEERING to teach steam engineering and power plant design in a technical institution. Location Massachusetts. R-1461.

INDUSTRIAL ENGINEER to do work in conjunction with an architect laying out equipments under the direction of a company's superintendent and mechanical engineer. Preferably a man who has had experience as chief draftsman in one of the larger construction companies of New York and Boston. Location New York City. R-1462.

CHIEF DRAFTSMAN to take charge of engineering departments; duties are to design all types of washing and ironing machinery, drying room tumblers, etc. Must be about 40 years of age, and have had experience along similar lines. Location Chicago, Illinois. R-1463.

AUTOMOTIVE ENGINEER; young man who is well posted on automobile engineering practice who is capable of systematizing office records and making detailed drawings for parts on machinery as well as giving advice in the best and latest equipment that is offered in automobile shop practice. Location Illinois. R-1464.

CHIEF DRAFTSMAN experienced in the manufacture of heavy machinery. Location Pennsylvania. R-1466.

CHIEF ENGINEER to have charge of a plant manufacturing heavy machinery. Location Pennsylvania. R-1467.

MECHANICAL DRAFTSMAN with machine designing experience. Three or four openings. Location Pennsylvania. R-1469.

SALES ENGINEER to sell power plant equipment; must be technical graduate and have had sales and combustion experience. Company furnishes an automobile and a drawing account. Location Philadelphia. R-1469-a.

TRAINED MECHANICAL ENGINEER with a knowledge of machinery and small parts. Preference will be given to the man who is particularly qualified from the purely technical side. The use of a good deal of higher mathematics will be necessary in this work. The man selected for this position may be teaching in one of our technical schools, or he may be in a position where commercial limitations are set on his technical development. The opportunity offered is that of assistant to the head of the Engineering Division of a large corporation selling to the machinery field. Location New York City. Salary depends on man. R-1470.

ASSISTANT CHIEF ENGINEER for position with a steel manufacturing concern. Location Akron, Ohio. R-1471.

MASTER MECHANIC; must have had extensive experience in manufacturing steel products and punch and die work. Location Akron, Ohio. R-1473.

MECHANICAL DRAFTSMAN who has had experience in sheet mill power plant work desired. Excellent opportunity for the right man. Location Edgewater, New Jersey. Salary depends on man. R-1474.

TESTING AND INSPECTION ENGINEER, must be graduate engineer who has had experience in testing and inspection for a large testing laboratory. The man to handle the work must have a pleasing personality and be familiar with business methods all in addition to testing and inspection business. Good opportunity for advancement. Location Seattle, Washington. R-1475.

PUBLIC UTILITY MANAGER to manage electric light and water works company; must have had experience in the management of

public utilities. Man between 35 and 40 years of age preferred. Location Texas. R-1479.

CHIEF DRAFTSMAN to take responsible charge of the designing and drafting end of engineering department. Must have had extensive experience in the design of plants, especially those related to the chemical industry. Must be familiar with both structural steel and concrete work. Will also be required to deal with clients from time to time and must possess the character and personality required to meet men standing high in their profession. Man about 30 to 35 years of age preferred. Location Massachusetts. Salary depends on experience. R-1482.

HIGH GRADE WORKS MANAGER wanted by a large and well established anutomobile company; must be thoroughly competent and experienced in general engineering and plant maintenance, must be energetic; exceptional managing abilities required. Application should be complete as to details, and business references, also should be accompanied by photograph if convenient. Position offers exceptional opportunities for the right man. Location Michigan. Salary depends on experience. R-1483.

ASSISTANT TO WORKS MANAGER; several capable assistant works engineers wanted by a large automobile company. Application should be complete as to details and business references, also should be accompanied by photograph if convenient. These positions offer exceptional opportunities for the right men. Location Michigan. Salary depends on experience. R-1484.

COMBUSTION ENGINEER; 25 to 45 years of age, for research and development work; must possess tact and personality; and must be prepared to take a financial interest in the company. Location New York City. R-1485.

FACTORY EXECUTIVE who has had experience in melting of brasses and bronzes in oil fired reverberatory furnaces. Location New Jersey. R-1487.

MECHANICAL ENGINEERING INSTRUCTORS; openings for two recent graduates. Location Pennsylvania. R-1489.

PRODUCTION ENGINEER; technical graduate with 2 or 3 years' experience in production or general manufacturing methods, to fill position with progressive manufacturer of small tools. Position is one which offers fine opportunity to right man. Location Connecticut. R-1490.

CHIEF DRAFTSMAN; must have had experience designing screw thread machines. Location New York City. R-1496.

TOOL DESIGNER; must be first class tool, jig and fixture designer; will also be required to do some machine tool designing; prefer a man with technical education, and one capable of developing into a production engineer. Location Ohio. R-1499.

RECENT M. E. GRADUATES from recognized engineering schools to begin work in the research department of a concern manufacturing drying machinery; and to become ultimately connected with the sales force. Two openings. Location East. R-1500.

HYDRAULIC ENGINEER; to sell hydraulic presses; must have had extensive experience in hydraulic engineering, and be used to heavy machinery; must be acquainted in Pittsburgh District. Location Pennsylvania. R-1501.

MECHANICAL DESIGNER fully acquainted with machine shop and foundry practice; preferably man having bad experience in the design of chemical machinery. Location New York City. R-1502.

CHIEF ENGINEER; highly skilled man, over 38 years of age, capable of designing machinery, jigs, fixtures, small tools, etc., is wanted to take charge of engineering department of large manufacturing concern; must possess executive ability, tact and diplomacy and be able to accomplish results. State age, education and experience in detail and salary expected. Location East. R-1503.

COMBUSTION ENGINEER; young mechanical engineer experienced in power plant efficiency; must be able to make recommendations on fuel economy. Plant uses about a thousand tons of coal a day. Location Ohio. R-1504.

RECENT M. E. GRADUATE with broad vision, and preferably with some experience on automatic machinery for research and development work. Good future. R-1505.

CHIEF DRAFTSMAN and engineer desired by a manufacturer of power plant specialties. Location Middle West. R-1507.

ESTIMATOR AND DRAFTSMAN with extensive experience in heating and ventilating work. Location New York City. R-1509.

CONSTRUCTION ENGINEER with architectural experience to inspect and supervise the erection of several welfare buildings in an industrial plant. After this four to six months' work is completed there is a chance for promotion into the organization if the man proves himself worthy. Location East. R-1510.

PRODUCTION MANAGER; young engineer, preferably mechanical, with some metallurgical experience to act as production manager. Must be of the executive type, and possess good personality; preference will be given to man with a varied commercial experience. Location New England. Salary depends on man. R-1515.

MECHANICAL ENGINEER experienced in pyrometry for position with a large manufacturing concern. Location Pennsylvania. R-1517.

MECHANICAL DRAFTSMAN capable to work under supervision. The work will consist of revising building plans, making layouts for machinery installations, piping layouts, plans for building additions, etc. Applicant will be expected to be able to go out through the plant and take measurements such as location of shafts, speed of pulleys, etc., and complete this work with only general supervision. Location South Dakota. R-1522.

LUBRICATION ENGINEER to advise the correct use of lubrication of the oils, greases, etc., for a copper refining plant employing 1500 men. Considerable amount of mechanical equipment including motors, generators, cranes, rolling stock, blowing engines, etc. Man must be able to develop system of inspection so as to improve qualities of materials purchased each year and their methods of application, so as to result in saving on machine repairs. Man must be somewhat trained in chemistry, in order to write oil specifications and intelligently interpret results of tests in order to see whether oils check up to requirements. Location New Jersey. R-1525.

SHOP FOREMAN to act as instructor. Must have had considerable experience in automobile machinery in order to enable him to take complete charge of shop. Location Michigan. R-1527.

CHIEF ENGINEER to take charge of engineering department and drafting room. Thorough experience in modern methods employed in elevating, conveying and handling of all kinds of material, and designing of the manchinery used for such purposes; also a thorough knowledge of the machinery, and of its application to the mechanical transmission of power. Location California. Salary depends upon man. R-1529.

SALES ENGINEER; high grade man to handle a line of dredging machinery. Location Pennsylvania. R-1530.

INDUSTRIAL ENGINEER; young graduate mechanical engineer with one or two years' experience in industrial plant work; must be able to assist in the installation and improvement of plant operating methods. R-1531.

MECHANICAL DRAWING INSTRUCTOR; young college graduate with some experience in teaching mechanical drawing and descriptive geometry, for position with southern University. Location Texas. R-1536.

DRAFTSMAN experienced on boiler and power house work; some estimating experience desired. Three or four openings. Location New Jersey. R-1538.

TIME STUDY MAN; young technical graduate, preferably M. E. for position as time study and rate setting engineer. Location New York State. R-1539.

MACHINE TOOL DESIGNER, thoroughly experienced for position as assistant to chief engineer and head of the drafting room, and designing force of a prominent machine tool concern in New England. Experience on milling machines and special production machines preferred. State age and give full particulars of past experience, familiarity with fixtures and tool work, if any, and salary desired. Only experienced men need apply. R-1545.

MECHANICAL ENGINEER with tool and jig experience on tractors. Location Iowa. R-1549.

ENGINEER thoroughly familiar with distilling, exaporating and drying machinery. Must be capable of taking charge of entire evaporator department including engineering and selling. Location New Jersey. R-1550.

YOUNG ENGINEER with about 3 years' practical experience in construction work to become assistant engineer. Will be put through a course of training lasting several months. R-1553.

YOUNG ENGINEER with about two or three years' practical experience for study on special machinery. After course of training, will travel around the world as demonstrator, erector, and salesman. Personality of man big factor. R-1554.

MECHANICAL DRAFTSMAN for detailing and designing automatic mac inery. Location Brooklyn. R-1555.

RECENT M. E. GRADUATE for work in steam power plant. Will have to check, test and generally look after the various gages and instruments around the plant and also make various tests on plant equipment. Will have to look after plant records and do some clerical work. Offers a splendid opportunity to obtain practical power plant experience. Location West Virginia. R-1558.

ASSISTANT INSTRUCTOR; recent technical graduate for position as assistant instructor in mathematics and surveying and possible descriptive geometry. Location New York State. R-1559.

STRUCTURAL STEEL DRAFTSMAN for work in Cuba; must be thoroughly experienced. New York interview. R-1561.

MECHANICAL DESIGNER; young mechanical engineer with two to three years' experience as designer and draftsman. Should understand building construction and be acquainted with labor saving machinery and plant layouts. Location South. R-1562.

WORKS ENGINEER with practical tecanical and administrative training, especially in connection with sugar mill machinery. Thorough knowledge of Spanish required, as the engineers, laborers, etc., with whom he will come in contact are Spanish. Location Cuba. R-1563.

EXPERIMENTAL DRAFTSMAN familiar with small automatic mechanisms principally those produced in large quantities by punch press methods, such as adding machines or typewriters. Location New York City. R-1566.

MECHANICAL DRAFTSMAN with 3 to 5 years' experience on electrical apparatus of small intricate nature. Location New York City. R-1567.

TOOL DESIGNER with about 3 years' experience, a punch and die specialist on small light work desired. Location New York City. R-1568.

SWITCHBOARD DRAFTSMAN accustomed to switchboard layout and design. Location New York City. R-1569.

PATENT DRAFTSMAN with at least 2 years' experience on the perspective rendering of

small automatic machinery. Location New York City. R-1570.

WORKS ENGINEER to take over a complete organization of a large factory and handle same without friction with the several departments; must have had several years' experience as works engineer or master mechanic with large industrial plant; and be about 35 years old. R-1572.

DESIGNER familiar with hydraulic work and capable of going ahead with detail and design work without supervision. Location Pennsylvania. R-1575.

DESIGNING ENGINEER capable of designing hydro extractors used in laundries, woolen mills, sugar plants, etc., and be thoroughly competent to handle this line of machinery entirely, doing the designing and all engineering work connected with it. Location Ohio. R-1579.

COLD STORAGE ENGINEER capable of laying out piping and taking care of construction for cold storage buildings. Location New Jersey. R-1580.

ENGINEER to design mining machinery, including electric hoists, for large Canadian manufacturer. State education, experience and salary expected. R-1589.

INSTRUMENT REPAIRMAN (ELECTRICAL) wanted for the Panama Canal. $197.60 month. Must be capable of testing, repairing and installing all types of Watt-hour meters, and indicating and curve drawing instruments, both alternating and direct current in portable and switchboard types. Also instrument maker, $1.05 hour, thoroughly experienced on engineering instruments. Must be American citizens, final papers, under 50 years of age, in good health. Free steamship transportation from New York or New Orleans, wages beginning date of sailing. Write "Chief of Office, The Panama Canal, Washington, D. C."

MACHINE TOOL SALESMAN thoroughly experienced in every branch of the machine tool business. Must have had actual selling experience of at least five years. Position open in Philadelphia territory. Good opportunity for the right man. R-1590.

POSITIONS AVAILABLE

MACHINE SHOP AND PRESS MANUFACTURING EXECUTIVE and general superintendent Must have good mechanical judgment and ability to carry through quantity production from planning and routing system already in operation. Position carries authority over all departments. Definite information tabulated concerning production. Must be a leader of men to properly handle labor for maximum production. Location Eastern Massachusetts. R-1591.

SALES ENGINEER. An excellent opening for a high class energetic sales engineer with initiative and good address. One who has had drawing room and designing experience in both structural and mechanical work preferred. Must be thoroughly posted in water tube boiler and combustion work. R-1592.

SALES ENGINEER to handle a line of furnace specialties in the Middle West. Prefer man familiar with furnace and boiler construction and operation. Salary and commission. Excellent opportunity. Write stating age, experience, etc. R-1606.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 12th of the month, and the form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

MECHANICAL ENGINEER, Worcester Polytechnic Institute graduate, age 27, with three years' experience in shop and drafting room. Prefer position as assistant to executive, but would consider other jobs offering opportunities for advancement. Ensign in the Naval Reserves, recently placed on inactive duty; married. Eastern location preferred. A-844.

MAINTENANCE OR DESIGNING ENGINEER, Cornell University; five years' experience in chemical and industrial machinery, desires position in the Far East or South America. A-1111.

YOUNG ENGINEER, American, age 24, with two years' experience, including shop, drafting, and production, desires position with industrial, commercial, or engineering concern, in technical or sales capacity; knowledge of German, some French; good correspondent; location abroad not objectionable. A-1739.

TECHNICAL ASSISTANT TO PRESIDENT, with exceptional experience in design and factory management as well as knowledge of salesmanship, advertising and accounting. A-2079.

SALES OR EXECUTIVE position wanted by mechanical engineer with degree and four years' varied experience in production and selling; also with good export knowledge. Available after September 1st. New York vicinity preferred. A-2766.

SUPERINTENDING ENGINEER OR ASSISTANT TO PRESIDENT, technical graduate; 19 years' broad experience in general mechanical engineering and practice; artificial refrigeration, air conditioning, power plants, refrigerating and ice making plants, packing house practice; also experienced in erection and design; successful experience in handling office and other help; best of references. Age 40; married; minimum salary $500 per month. A-3088.

SUPERINTENDENT OR MANAGER OF WORKS, involving construction, equipment, maintenance, production, development, or research. Technically trained in addition to being a practical mechanic. Exceptional ability for planning and working out large enterprises. Twenty years' extensive business experience, in this and other countries, along the following lines: shops, foundries, mills, industrial and power plants, special and rapid duplicate production, small, medium and heavy work. Working knowledge of Spanish. Live, progressive and practical leader obtaining the best from men and equipment by tact and common sense methods. Dependable habits, strong influential personality. Desires to connect with reputable party in need of exceptional service, with corresponding compensation. A-3449.

MANAGER OR GENERAL SUPERINTENDENT. Recently discharged officer of A.E.F., graduate engineer; 20 years' experience as practical mechanic, master mechanic, superintendent and general manager. Familiar with all details of iron and brass foundries; machine, carpenter, pattern, and forge shops; tool rooms and power plants, cost keeping and office work, and a successful executive. A-4189.

ENGAGEMENT WANTED AS CHIEF DRAFTSMAN, or chief engineer, on industrial plant construction, extension or maintenance. Experienced in several branches of engineering, budget systems and unit-cost keeping. Good executive; 18 years' practical experience. Can secure skilled technical assistants. Excellent record; many references. A-4509.

ENGINEER OF TESTS AND COMBUSTION ENGINEER. Stevens 1915. Three years' experience in general steam power plant betterment work; testing of all mechanical power plant apparatus and analysis of such tests to standardize operating conditions and improve efficiency. Special emphasis placed in boiler room economy work. At present employed. Location East or Middle West. A-4511.

PULVERIZED FUEL ENGINEER; age, 31, ex-army officer, desires position as chief engineer; 6 years' experience in designing, erecting, testing and operating all kinds of pulverizing, conveying and burning equipment for locomotives, power plant and metallurgical work, using all kinds of lignitis bituminous and anthracite coals. A-4568.

MECHANICAL ENGINEER, M.I.T. graduate, 32 years of age, married, recently released from the army, desires position in Massachusetts, preferably near Boston. Extensive experience in the maintenance of industrial equipment and in manufacturing. Salary to start, $3000. A-4578.

TECHNICAL GRADUATE, age 32, married, 6 years machinist, 2 years designer, 1 year superintendent, 2½ years industrial and mechanical engineer, thoroughly familiar with modern methods of organization, management and shop practice, desires connection with progressive concern. Location preferred, Middle West. Good executive. Salary $4200. A-4615.

SALES ENGINEER, thoroughly familiar with centrifugal pumps, design, tests, operation, and estimating, having some sales experience, wishes to enter the sales field with a reliable organization. Eastern location preferred. A-4616.

FACTORY EXECUTIVE with 18 years of comprehensive designing and engineering experience with several prominent concerns, principally in steam power plant machinery including turbines, desires to make permanent connection with modern and progressive organization. At present employed. Salary commensurate with responsibility. A-4617.

MECHANICAL ENGINEER. Technical graduate; post-graduate course at M.I.T.; 33 years of age; married. Two years' general engineering experience; 4 years in experimental and development work on airplanes; 6 years in experimental investigation of, and reports on, various appliances and systems including safety devices and oxy-acetylene welding and cutting apparatus; desires position with engineering or industrial concern. Chicago or vicinity preferred. Minimum salary $3000. A-4618.

MASTER MECHANIC for 22 years in large cotton mill in the East desires change to similar position or to a position covering installation and repairs of machinery. Location preferably in the East. A-4619.

HEATING, VENTILATING AND AIR CONDITIONING ENGINEER, technical graduate and married, desires position as assistant to chief engineer, large manufacturing corporation. At present in charge of engineering on work totaling $400,000; supervising reports, computations, design, specifications, estimates, purchase of equipment and installation. Can relieve chief engineer of the heating problem entirely. Salary $350 per month. A-4620.

ENGINEER EXECUTIVE; age 38, mechanical engineering graduate; experience in teaching practically all subjects in mechanical course as instructor to full professor; 8 years' practical work in power plant design, reënforced concrete, factory layout, machine design, and construction; desires position as engineer, assistant to superintendent, chief executive, or sales manager; at present employed, but available on reasonable notice. West or Middle West preferred. A-4621.

WORKS OR CONSTRUCTION ENGINEER open for engagement in near future; 14 years' experience in field and office on plant extension and improvement work, building construction, machine installation and maintenance; experience covers a broad field in civil and mechanical work on design, specifications, erection and maintenance; in responsible charge of work 10 years. Age 37 years. Good health. Would consider production work. A-4622.

SHIP YARD EXECUTIVE, engineer, age 36, with 12 years' experience in marine construction, both hull and machinery installation on naval and commercial type vessels, has held positions of chief engineer and yard superintendent. Similar position desired. A-4623.

INDUSTRIAL ENGINEER, age 30 years, technical graduate; 2 years' experience on scheduling routing, time study, planning, production and cost accounting; 5 years on heavy machinery, industrial plants, power plants, heating and ventilating work, estimating and specifications; with present firm 2 years; desires change with better prospects for advancement. A-4624.

MECHANICAL AND METALLURGICAL ENGINEER; over 20 years' experience in large steel works, designing and erecting melting and heating furnaces; thorough knowledge of metallurgy, and heat treatment; no objection to sales. A-4625.

MECHANICAL OR PRODUCTION SUPERINTENDENT; 15 years' experience in production and engineering work, now employed, will be open for engagement September 15. A-4626.

ENGINEERING EXECUTIVE; graduate mechanical engineer, age 35; 8 years' experience with Pennsylvania Railroad on special technical investigations, shop installations and management, purchase of machinery, etc.; 2 years in charge Chicago office for steel company; 1½ years with Ordnance Department, U.S.A., charge of engineering and process inspection on contract involving millions. Open for engagement now, location immaterial. A-3728.

YOUNG SALES EXECUTIVE now holding excellent position desires to change for personal reasons. Is well versed in costs and production of steel products in a jobbing business as well as a standard product business. Will consider position in managerial capacity. Married. Cornell mechanical engineer. Available after thirty days' notice. A-4627.

PRODUCTION ENGINEER OR ASSISTANT SUPERINTENDENT; age 33; graduate Stevens Institute; specialized on methods of production, planning, time study and costs for last 8 years; 4 years of general shop and design experience previous to specializing on production work. At present employed. Salary $3600 to $4000. Location New York City or vicinity. A-3221.

POSITION AS ASSISTANT ENGINEER OR ASSISTANT TO WORKS MANAGER desired by technical graduate, age 28; 4 years' experience in general engineering, including gas distribution, gas works operation, toluol production, machine shop planning and production. Experience and best results obtained in handling records and reports. At present employed. Married, and family. Minimum salary $2500 yer pear. Philadelphia location necessary. A-4639.

SALES ENGINEER OR ASSISTANT MANAGER; technical graduate, 1914, connected with Gas Defense Division of War Department as production and inspection consultant; 4 years as assistant to consulting engineers for large street railways, power plant operation, etc.; age 28. Salary $2800 to $3000. A-1248.

MECHANICAL ENGINEER, graduate, 6 years' experience in manufacture of interchangeable parts, including one year building of heavy artillery; thorough organizer, well versed in modern methods of plant management; planning, production, costs, and sales; desires connection with large progressive concern. A-4087.

WORKS MANAGER OR EXECUTIVE ENGINEER; technical graduate; 18 years' active experience, past 10 years in executive charge as works engineer, mechanical superintendent of large industrial plants. Good executive, familiar with general accounting, plant efficiency and business methods as applied to industrial plant operations. A-4651.

ELECTRICAL ENGINEERING GRADUATE; age 30, single, desires permanent location with chance for advancement; 8 years' experience, mostly mechanical, in steam turbine operation, test and installation; also in compressed air; familiar with iron and steel industry. Salary $3000. Can handle men. Employed at present. A-4650.

SALES AGENCIES WANTED. Technical graduate, with over 20 years' selling, construction and operating experience and having unusually wide acquaintanceship among public utility operators, engineers and general contractors, desires to negotiate with manufacturers of machinery and electrical equipment to handle sales and distribution if desired, in East and for export trade. Headquarters New York. A-1370.

COMBUSTION ENGINEER; technical graduate; experienced in the maintenance and operation of large power plants, economical generation and distribution of steam power and process work, and testing and efficiency reports, desires position with large paper or chemical company as combustion engineer or power superintendent. Age 26; married; minimum salary $2700. Location East or Middle West. A-4510.

SALES ENGINEER, technical graduate, age 29, married; experience in general electric test; power plant testing and operating in large central stations in and near New York City; and in electrical apparatus and power stations on steam railroad; wishes to enter sales work with some firm in or near New York City where the foregoing experience will be valuable. Best of references. Available on short notice. A-3268.

MECHANICAL ENGINEER; technical graduate; 3 years' experience constructing, testing, and operating steam machinery, both marine and stationary; age 24, married; desires sales engineering position.

MECHANICAL AND ELECTRICAL ENGINEER; technical graduate, age 36, married; experienced in the purchase of materials, design, construction, operation and maintenance of power plants; also in combustion engineering in connection with gas producers and fuel oil heat treating furnaces. At present employed as power engineer for a large steel company. Salary commensurate with responsibilities. A-4652.

CAPTAIN OF ENGINEERS, Coast Guard, qualified Naval Aviator, 10 years' engineering experience, commanding Naval Air Station during war, would like connection with aviation or automobile concern as engineer or executive. Salary $4000. A-4668.

PLANNING AND MAINTENANCE ENGINEER. First-Lieutenant, Ordnance Department; graduate of M.I.T. in mechanical engineering; age 27. Two years' experience in industrial plant-layout work, planning, maintenance and improvement of production machinery and power-house equipment; 2 years with Engineering Division, Ordnance Department, on development work with machine guns and small arms. Varied experience at all of small-arms ammunition and machine gun plants in country. Position desired with industrial concern requiring planning, maintenance, development or research work. New York City or vicinity preferred. Salary $2400. Available immediately. A-4368.

MECHANICAL ENGINEER, Cornell graduate, married; 5 years' responsible experience in production work in machine shops, and extensive experience adapting scientific methods of management and installation of premium rates. At present employed, in charge of experimental department of large concern. Prefer location in Eastern section. Minimum salary $5000. A-4669.

FOREIGN TRADE. Executive of ability and aggressiveness; technical graduate, speaking five languages, with a varied experience in modern lines of management and production; making investigations of trade possibilities and requirements in Europe and the Latin Americas; establishing agencies and directing their activities, is desirous of making permanent connection with a large corporation contemplating the establishment of foreign relations. A-2144.

WORKS MANAGER OR PRODUCTION MANAGER. Graduate M.E. from Stevens Institute of Technology; thoroughly versed in scientific management, cost-production methods, planning, scheduling and dispatching; wide experience in manufacturing lines. Would like executive position with well-organized concern. Available at once. A-3248.

ASSISTANT PRODUCTION MANAGER, age 29, married, with 8 years' varied experience in testing, inspection and sales work in power plant and sub-station fields desires engagement with growing and progressive concern. A-429.

MECHANICAL ENGINEER; technical graduate; age 28; desires position along executive lines, on production; experienced in development design and manufacture of automatic machinery. Thoroughly familiar with all branches of shop practice. Minimum salary, $2600. A4052.

WORKS MANAGER, and manufacturing engineer, American, age 36, unusually qualified in highest grade manufacture of standardized heavy machine equipment, precision machine tools, tractors, and textile machinery, desires a proposition carrying complete control of a manufacturing plant, with a salary not less than $10,000. A-1054.

TECHNICAL GRADUATE, Naval Reserve Officer, age 25, desires connection with manufacturing concern where executive, engineering and business ability can be exercised; 4 years' varied experience in general engineering work in connection with steel plant operation, manufacturing and office work. Available on short notice. Excellent references. A-3277.

RECENT STEVENS GRADUATE, just out of naval service, desires position as power plant engineer or experimental engineer with some industrial concern. Has had 18 months' experience in steam engineering. A-4682.

INDUSTRIAL OR EFFICIENCY ENGINEER. Columbia graduate; 4 years' experience on construction work; in charge of electrical and mechanical equipment, in all departments of a large electric light and power company; deeply interested in industrial problems. At present pursuing an extension business course. A-247.

MECHANICAL ENGINEER, age 38; last 4 years manager sulphuric acid plant, desires connection in Philadelphia or vicinity. Technical graduate. Other experience in water works, fertilizer factories, coal mines, shops and cement plants as designer and superintendent of construction. A-4698.

MECHANICAL ENGINEER, age 24, technical graduate, 2 years' practical shop, drafting room, and engineering experience, desires position with future as mechanical engineer or in engineering sales. Location Pennsylvania preferably. A-2819.

MECHANICAL AND ELECTRICAL ENGINEER. M.I.T. graduate desires position as production manager or efficiency engineer with manufacturing company; had 6 years' experience in manufacturing field; thoroughly familiar with scientific method of management and modern machine shop practices. A-4699.

TECHNICAL GRADUATE, 34 years of age, with broad experience as designer, erecting engineer, master mechanic and production manager in several branches of industry, would like to make a connection with a large horticultural undertaking, either in this country or abroad, where the services of a capable technical man are needed. A-3731.

MECHANICAL ENGINEER, technical graduate, age 25, three years' experience in the management of excavating machinery. At present employed but desires to make a change to position which offers greater opportunity for advancement. Location in South or West preferred, but will consider position in West Indies or South America. A-4700.

SPECIALIST, mechanical and electrical, graduate M.E. with years of experience in engineering office and laboratory lines of work; designs, estimates, researches and investigations, tests, reports, technical writing, editorial work; available two days weekly, Chicago and vicinity. A-4701.

SALES ENGINEER OR ASSISTANT TO EXECUTIVE; technical graduate; age 25, with 4 years' experience in building construction and installation of mechanical equipment. Recently released from Government service; desires to locate in New York district. Would consider moderate salary to start in position with a future. A-1581.

EXECUTIVE OR PRODUCTION ENGINEER; age 37, married; 17 years' experience in manufacturing, as foreman, designer, and chief draftsman on special machinery, tools, gages, jigs, and fixtures; past 6 years on design production and inspection of rifle and machine gun parts. A-4702.

CHEMICAL PLANT EXPERT; specialized in the requirements peculiar to the chemical industry. Experience in the development of plant from results of chemical research; also in construction, maintenance, and operation; desires a position with opportunity for advancement. A-4703.

$25,000-$100,000 CAPITAL available for the development of a manufacturing proposition in the brass or steel industry provided that the stock control rests with two engineers furnishing the capital and that they take an active part in the management. For further information apply to Box E. S. E. B. No. 10.

EXECUTIVE ENGINEER, technical graduate, 33 years old, with wide manufacturing experience; has served overseas; wishes to join with someone, or to know of a company already established that may be in need of rehabilitation, additional funds or one which is expanding. Rigid investigation required and given. New York preferred. A-4735.

MECHANICAL ENGINEER, army officer, age 27; graduate Penna State College; 9 years' railroad experience; 2 years' service in France, principally liaison engineer work; speaks French. Desires to represent mechanical firm in France, Belgium or Switzerland. A-4713.

MECHANICAL ENGINEER FOR INDUSTRIAL PLANTS. Desires position as engineer in charge of maintenance, improvements, extensions, and construction of new plants; experience includes design of boilers, tanks, etc.; handling machinery; layout of machine shops, and power transmission machinery. Formerly U. S. A. Engineer Officer. A-1457.

PRODUCTION SUPERINTENDENT; 20 years' experience in designing and operating automatic machinery and as production superintendent in large factory requiring great accuracy in its product. Specialty, introducing new methods to produce work to gage and for assembling by unskilled help. Nearly three years in war contract work. Experienced in designing and operating machinery for making sapphire cutting tools. Desires personal control of the mechanical methods for producing product. Minimum salary, $5,000. A-3752.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER OCT. 18

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 188.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by Oct. 18, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

California

CUMMINGS, FRANK S., Mechanical Engineer, South California Edison Co., Los Angeles
GUNTHER, ERNEST, Sheet Metal Worker, California Corrugated Culvert Co., West Berkeley
LAUGHLIN, HOMER, JR., President, Laughlin Fruit Refiners, Inc., Los Angeles
SHADE, NEVIN R., Draftsman, General Petroleum Corp., Vernon
WICHMAN, ARTHUR F., Engineer and Salesman, Berger & Carter Co., San Francisco

Connecticut

HALLAM, MARK J., Engineer, Bridgeport Brass Company, Bridgeport
HENRY, JOHN M., Research Engineer, Pratt & Whitney Co., Hartford
JOHNSTON, HAMPTON W., Master Mechanic, Bridgeport Brass Co., Bridgeport
McILWAIN, ROBERT W., Fixture & Tool Designer, Nash Engineering Company, South Norwalk
MEILY, JOHN J., Director of Personnel, American Tube & Stamping Co., Bridgeport
ROBINSON, ORIN P., Experimental Department, Electric Boat Co., Groton
SHAFFER, THOMAS G., Secretary, The Shaffer Marsh Co., Hartford
TANNER, EDWIN L., Electrical Engineer, Columbia Graphophone Mfg. Co., Bridgeport

Delaware

TILDEN, PHILIP VAN A., Junior Engineer, E. I. du Pont de Nemours & Co., Wilmington

District of Columbia

CLEARE, WILLIAM M., Assistant Physicist, Bureau of Standards, Washington
FULLMER, IRVAN H., Assistant Physicist, Bureau of Standards, Washington
HOCH, GEORGE W., Inspector of Mechanical and Electrical Engineering of the Supervising Architect, Treasury Department, Washington
HORLE, LAWRENCE C. F., Expert Radio Aide, Navy Department, Washington
KELLY, JOSEPH T., JR., Major Engineers, U. S. A., Washington
MILLER, FERDINAND, Draftsman, Ordnance Department, Railway and Seacoast Carriage Section, Washington

Illinois

BLISS, HAROLD D., Chief Mechanical Engineer, Morris & Co., Chicago
BORN, WILLIAM G., Chief Engineer, John Mohr & Sons, Chicago
DEARBORN, ARTHUR S., Chief Mechanical Engineer, Crossland-Pfaff Engineering Laboratories, Chicago
EICHHORN, HARRY L., Chief Draftsman, The Payson Mfg. Co., Chicago
HILL, PHILLIP S., Engineering Department, Isko Co., Chicago
HUDSON, FINN B. S., Consulting Engineer, Chicag
KENTISH-RANKIN, IVOR L., Technical and Associate Editor, "Electrical Review," Chicago
MOHR, WILLIAM J., Treasurer, John Mohr & Sons, Chicago
POHLMANN, EDWARD C., Assistant Editor, American Garage & Auto Dealer, Chicago
SHACKLETON, ROY, General Superintendent, Green & Sons Co., Chicago
SLOCOMB, GEORGE H., Works Engineer, Aluminum Ore Co., East St. Louis

Indiana

FRANCE, EDGAR G., General Superintendent, The Singer Mfg. Company, South Bend
WALKER, EDWIN M., General Manager, Indianapolis & Eastern Traction Co., Terre Haute

Iowa

MADSEN, SERN, Mechanical Engineer, Curtis Brothers & Co., Clinton

Kansas

PETTY, EARL, Assistant Supervising Engineer, Empire Gas & Fuel Co., El Dorado
STONE, JOHN R., Mechanical Engineer, War Department, United States Disciplinary Barracks, Fort Leavenworth

Louisiana

BLACK, JAMES R., Lieutenant, U.S.N.R.F., U.S.S. "Illinois," Engineering Duty, New Orleans
DROMGOOL, PETER J., Superintendent Engineer, Pan American Petroleum & Transport Co., New Orleans

Massachusetts

BENNETT, COOLIDGE J., Mechanical Superintendent, Bigelow Hartford Carpet Co., Lowell
BROOKS, PHELLIPS N., Production Engineering, Ashton Valve Co., Cambridge
DAVIS, HARVEY N., Professor of Mechanical Engineering, Harvard University, Cambridge
DEXTER, BAYARD P., Treasurer and Manager, Leavitt Machine Co., Orange
GRAMMER, REYNOLD A., Mechanical Draftsman, Stone & Webster, Boston
PRESTON, SOLON F., Plant Engineer, Hendee Mfg. Co., Springfield
PRINCE, WARREN F., Assistant Master Mechanic, Saco Lowell Shops, Lowell
SHUTE, FREDERICK W., Chief Engineer, Wilton Tool & Mfg. Co., Boston
SITTINGER, CARL J., Mechanical and Electrical Engineer, John A. Stevens, Lowell
SOMERS, RAY L., Plant Engineer, Greenfield Tap & Die Corp., Greenfield
WAGNER, OSCAR A., Chief Draftsman, Wilton Tool & Mfg. Co., Lynn
WILLS, MARMADUKE M., Shop Engineer, Manning, Maxwell & Moore, Inc., Fitchburg

Michigan

JOHNSON, RICHARD S., Factory Manager, Smalley General Co., Bay City
LOVELL, THOMAS S., Designing Engineer, Power Construction Department, Ford Motor Co., Highland Park
PASINSKI, WALTER J., Engineering Manager, Burroughs Adding Machine Co., Detroit
TONKIN, WILLIAM, Mechanical Structural Designer and Draftsman, Quincy Smelting Works, Hancock

Minnesota

BAKER, GEORGE E., Draftsman, Clyde Iron Works, Duluth
RUEMELIN, RICHARD, Chief Mechanical Engineer, Twin City Forge & Fdry. Co., Stillwater

Missouri

FRANKENHOFF, CHARLES A., Resident and Designing Engineer, Black & Veatch, Kansas City
KEETH, JACOB A., Detail Engineer, Kansas City Light and Power Co., Kansas City
MALL, IVOR O., Draftsman, Harrington, Howard & Ash, Kansas City

New Hampshire

WILLIAMS, EDGAR H., Superintendent of Construction and Master Joiner, Atlantic Corp., Portsmouth

New Jersey

BARRON, JACOB T., General Superintendent of Production, Public Service Electric Co., Newark
BOCKIUS, LOGAN, Special Engineer, Roessler & Hasslacher Chemical Company, Perth Amboy
CARLITZ, FRED G., Marine Engineer, U. S. Emergency Fleet Corporation, Port Newark
JENIK, LOUIS A., Acting Superintendent, Small Motor Department, Crocker, Wheeler Electric Co., Ampere
KILLOUGH, WALTON B., Resident Engineer, Standard Oil Company, Elizabeth
LESLIE, S. INGLIS, Secretary and Treasurer, The Leslie Co., Lyndhurst
PERAGALLO, JOSEPH J., Draftsman, Babcock & Wilcox Co., Bayonne
SCHEIDL, HENRY, Mechanical Engineer, Singer Mfg. Co., Elizabethport
SMITH, E. BURTON, Manager, Maintenance International Arms & Fuze Co., Bloomfield
WHITNEY, WILLIAM O., Assistant Manager, Brunswick Refining Co., New Brunswick

New York

AITKEN, GEORGE T., Sales Manager, Frontier Chuck & Tool Co., Buffalo
BERCHEM, ALFRED, Master Mechanic, Breakstone Brothers, Inc., Walton
BERDGE, EDWARD A., Tool Engineer, Sperry Gyroscope Co., Brooklyn
CAIROLE, CARLETON S., Chief Draftsman, National Conduit & Cable Company, Hastings-on-Hudson
CHARLES, PHILIP S., Major, Ordnance Department, U.S.A., Rochester
CHUBB, HARRY W., Tool Designer, Sperry Gyroscope Co., Brooklyn
DIETRICHSON, WILLIAM F., Designing Engineer, American Car & Foundry Co., New York

DOUGHERTY, PROCTOR L., Manager, Washington, D. C., Otis Elevator Co., New York
ELLINSKY, LEONID I., Mechanical Engineer, Member of Russian Mission of Ways of Communication, New York
FLECK, ANTHONY G., Chief Engineer, Pneumatic Concrete Machinery Co., New York
FORGEE, FREDERICK A., Consulting Engineer (Re-election), New York
FOSTER, ANDREW J., Valuation Engineer, Electric Bond & Share Company, New York
GARNER, ENOCH F., Instructor Machine Design, Cornell University, Ithaca
HAMMARSTROM, ERIK, Mechanical Engineer, West Virginia Pulp & Paper Co., New York
HEYMAN, NICHOLAS, Instructor, Machine Design, Pratt Institute, Brooklyn
HILDENBERGER, THOMAS A. D., Manager, Lubricating Department, Ohio Cities Gas Company, New York
KARGE, MOSWELL R., General Manager, Karge Baker Corp., Phoenix
KLITENICK, MARK, Tool Designer, John Thomson Press Co., Long Island
LANDIN, MAURICE, Junior Electrical Engineer, Public Service Commission, New York
LEARNED, GEORGE E., President, Combustion Engineering Corporation, New York
LISTER, FRANCIS E., Engineer, Audiffren Refrigerating Machine Co., New York
LORD, W. M. B., Assistant to Engineer in Charge, Westinghouse, Church, Kerr & Co., New York
LUCE, RICHARD S., Examiner, U. S. Shipping Board Emergency Fleet Corp., New York
McAUSLIN, WILLIAM J., Marine Superintending Engineer, M. H. Tracy Steamship Co., Brooklyn
McCORMACK, RAYMOND A., Chief Engineer, Arthur Knapp Engineering Corporation, New York
McLAUGHLIN, ELWOOD F., Mechanical and Electrical Engineer, General Electric Co., Schenectady
MacDERMOTT, STEWART S., Engineer, Western Electric Co., New York
MacDONALD, WILLIAM F., Tool Engineer, Sperry Gyroscope Co., Brooklyn
MARSH, HARRY S., Chief of Engineering Department, Ford Instrument Co., New York
MILLER, GARRETT E., Mechanical Designer, American Sugar Refinery Co., New York
MONTGOMERY, GEORGE A., Chief Inspector, Ordnance Department, U.S.A., Yonkers
PAFFRATH, HUGO J., Superintendent, John Thomson Press Co., L. I. City
PEYINGHAUS, ROBERT, Shops Superintendent, Wilson Welder & Metals Co.
POPP, J. L. T., Chief Engineer, Dobbie Foundry & Machine Co., Niagara Falls
PUC, VOJTECH, Manager, Waldes & Co., L. I. City
PULLER, OTTO G., Co-Partner, Pull-mann Engineering Service, New York
REAGAN, FRANK H., General Manager, Locke Insulator Mfg. Co., Victor
ROSENBERG, SIDNEY, Mechanical Engineer, U. S. Government, War Department, New York
SALMOW, DANIEL, Brooklyn
SCOTT, ABRAHAM L., Assistant Production Routine Engineer, National Conduit & Cable Co., Hastings
SEMMES, GEORGE W., Chief Engineer & Vice-President, Akerlund & Semmes, Inc., New York
SMITH, CHARLES H., Experimental Engineer, Anti-Corrosion Engineering Co., New York
SPAIN, BATT L., Commercial Engineer, General Electric Co., Schenectady
TAYLOR, NEWELL E., Engineer, Sales Department, Ingersoll-Rand Co., New York
WEBER, THEODORE G., Superintendent of Works, Central Union Gas Co., New York
ZETTERGREN, CHARLES, Draftsman, Dwight P. Robinson & Co., Inc., New York
ZIMMERMAN, EDWIN W., Engineering Department, American Trading Company., New York

Ohio

BEAUMONT, FREDERICK R., Designing Engineer, The McKinney Steel Company, Cleveland
BECKER, WAYNE A., Sales Engineer, Ingersoll-Rand Co., Cleveland
BORNSTEIN, JOSEPH, Mechanical Engineer, Penn Piston Ring Co., Cleveland
BRUSSTAR, BENJAMIN F., Vice President & General Manager, Cleveland Brass & Copper Mills, Inc., Euclid
JONES, HOMER W., Engineer Machine Development, National Carbon Co., Inc., Cleveland
LOGAN, CHARLES F., Designing Engineer, Wellman-Seaver-Morgan Co., Akron
McHENRY, ROY B., General Manager, The Cleveland Planer Co., Cleveland
MARTIN, C. VERNE, Mechanical Engineer, National Supply Co., Toledo
MATTESON, ROBERT D., General Superintendent The John F. Byers Machine Co., Ravenna
PATTERSON, THOMAS, Master Mechanic, The National Tube Co., Lorain
REEDY, CHARLES, President & Engineer, H. J. Reedy Elevator Co., Cincinnati
TALBOT, NELSON S., Dayton Metal Products Co., Dayton
THOMPSON, HORACE W., District Manager, Bardons & Oliver, Cleveland
WETHERILL, ROBERT, JR., Designing Draftsman & Assistant Engineer, The Wellman-Seaver Morgan Co., Cleveland

Oklahoma

COYLE, ROBERT M., Superintendent, Bartlesville Division, Mid Co. Gasoline Co., Bartlesville

Oregon

MATTER, GUSTAVE O., Plant Engineer & Superintendent Machine Construction, Concrete Pipe Co., Portland

Pennsylvania

ARGYLE, WILLIAM R., Assistant Physicist, U. S. Bureau of Mines, Pittsburgh
BRIDGES, JAMES W., Instructor U. S. Shipping Board, Carnegie Institute of Technology, Pittsburgh
BROUGHTON, HAROLD E., Maintenance Engineer, Trojan Powder Co., Allentown
CABLE, HERBERT W., Tool Designer, Colburn Machine Tool Co., Franklin
CHALKER, ALBERT R., Chief Draftsman, Locomotive Stoker Co., Pittsburgh
DAUGHENBAUGH, LAURENCE W., Examiner, Baldwin Locomotive Works, Philadelphia
DIEHL, AMBROSE N., General Superintendent, Carnegie Steel Co., Duquesne
HARRISON, JEROME G., Engineer, Emergency Fleet Corp., Philadelphia
HILLER, PAUL W., Erecting Foreman, Carbondale Machine Company, Carbondale
HUNT, GEORGE A., Superintendent of Fodge, Savage Arms Corp., Sharon
KATZENMEYER, JOHN A., General Manager, Standard Engineering Co., Ellwood City
McNAIR, CHARLES, Mechanical Expert, Galena Signal Oil Co., Franklin
MURPHY, DEANE, District Manager of Sales, West Leechburg Steel Co., Pittsburgh
PALMER, ROY C., Draftsman, Pennsylvania Railroad Co., Altoona
SCHWAB, DELMER B., Mechanical Engineer & Chief Draftsman, Bovaird & Seyfang Mfg Co., Bradford
SMITH, CHARLES R., Instructor of Machinery, Chester High School, Chester
STEIGER, WILLIAM A., Mechanical Engineer, Navy Department, Philadelphia Navy Yard Philadelphia
TORRENCE, FRANK M., Assistant Professor of Mechanical Engineering, Pennsylvania State College, State College
WALSH, THOMAS A., Safety Engineer, Merchants Ship BuildingCorp., Harriman
WANNER, EDGAR P., Engine & Turbine Repairman, Midvale Steel & Ordnance Co., Coatesville

Tennessee

GAHAGAN, BENJAMIN W., Superintendent, H. J. Moore, Sweetwater
WARE, A. J. V., Engineer, Memphis Cotton Hull & Fibre Co., Ltd., Memphis

Texas

HILL, HOWARD G., Mechanical Pilot Engineer, Southern Pacific Lines, Houston

Virginia

BREAKELL, JAMES, Chief Engineer, The Viscose Co., Roanoke
WEST, JOHN W., JR., Assistant Engineer, State Corporation Commission, Richmond

Wisconsin

BROWN, EDWIN H., Testing Engineer, Allis-Chalmers Mfg. Co., Milwaukee
FLORY, A. C., Manager, Steam Turbine Department, Allis-Chalmers Mfg. Co., Milwaukee
HOTCHKISS, HOWARD C., Assistant Factory Engineer, Wallis Tractor Co., Racine

Canada

BROWN, GEOFFREY C., Chief Time Study & Rate Setting Department, Northern Electric Co., Ltd., Montreal
GREYSON, F. RAYMOND, Chief Draftsman, British America Nickel Corp., Nickelton, Ontario

England

ABRAHAM, FREDERICK H., Technical Assistant Bradford Electricity Department Bradford Corp., Bradford Yorks
HEENAN, JOHN W. D., London Manager, Power Specialty Co., London

France

DEANGELIS, MARIUS L., Engineer, Messrs. Thomson Houston Co., Paris

Mexico

SHAW, SILAS F., Superintendent, American Smelting & Refining Co., Charcas, San Luis

Quebec

MILLS, NATHANIEL C., Consulting Engineer, Montreal

CHANGE OF GRADING

PROMOTION FROM ASSOCIATE-MEMBER

Illinois

BELL, ANDREW L., Assistant Manager, Barber Asphalt Paving Co., Madison

Minnesota

ZIMMERMAN, FRANK R., Chief Engineer & Superintendent, National Iron Co., Duluth

New York

MITCHEL, ALBERT H., New York Representative, Taft-Peirce Mfg. Co. New York
SCHEIN, ALEXANDER, Ship Stabilizer Engineer, Sperry Gyroscope Company, Brooklyn

North Carolina

HEYWARD, THEODORE C., Assistant Manager, Thos. B. Whitted, Charlotte

Tennessee

WEIGEL, ALBERT C., Eastern & Export Manager, The Walsh & Weidner Boiler Co., Chattanooga

PROMOTION FROM JUNIOR

California

CONNOR, HERBERT R., Sales Engineer, The Meese & Gottfried Co., San Francisco

Connecticut

ROGERS, FRED E., JR., Sales Engineer, Fafnir Bearing Co., New Britain
STRING, JOSEPH S., Partner, String-Lunn Co., New Haven

District of Columbia

OAKES, CHARLES E., Associate Electrical Engineer, Bureau of Standards, Washington

Massachusetts

LEWIS, ARTHUR L., President, Worcester Steel Products Co., Worcester

Missouri

BUFORD, EDWIN H., Assistant Chief Engineer, Monsanto Chemical Works, St. Louis

New Jersey

HAGERTY, WALTER W., Chief Draftsman, Roessler & Hasslacher Chemical Co., Perth Amboy

New York

BREWER, ALLEN F., Combustion Engineer, The Texas Co., New York
HILL, HERBERT M., Mechanical Engineer, Paper Utilities Corp., New York

KEENE, ALBERT R., Chief Engineer, Doehler Die Casting Co., Brooklyn
MULLER, RAYMOND W., Service Engineer, Walter Kidde & Co., New York

Pennsylvania

BARTON, CHARLES R., Engineer, Edgewater Steel Co., Pittsburgh
PENNELL, SAMUEL H., Assistant Manager, Ballinger & Perrot, Philadelphia
SIBSON, HORACE E., Engineer of Sales, Harrison Safety Boiler Works, Philadelphia

SUMMARY

New Applications	168
Change of Grading	
Promotion from Associate-Member	16
Promotion from Junior	14
Total	198

SUMMARY SHOWING AVERAGE AGE AND POSITIONS OF APPLICANTS ON BALLOT CLOSING AUGUST 29, 1919

Average age of applicants	
Members	40
Associates	46
Associate-Members	31
Juniors	25
Chief Engineers	12
Construction Engineers	2
Consulting Engineers	4
Designers	7
Draftsmen	8
Chief Draftsmen	6
Electrical Engineers	2
Estimator	3
Executives (Pres., Vice-Pres., Sec'y-Treas., Mgrs.)	17
Industrial Engineers	3
Instructors	1
Master Mechanic	1
Mechanical Engineers	18
Asst. Mechanical Engineers	3
Plant Engineers	3
Production Engineers	2
Professors	2
Asst. Professor	1
Research Engineer	1
Sales Engineers	5
Sales Managers	1
Superintendents	8
Asst. Superintendents	3
Supervisors	2
Miscellaneous	33

UNITED STATES GOVERNMENT SERVICE

Major	1
Captain	2
First Lieutenant	3
Ensign	1

ADDRESSES OF MEMBERS REQUIRED

Mail recently sent to the following members of the Society has been returned, address unknown. Any information regarding the present location of these members will be appreciated by the Secretary.

ADDRESS DOUBTFUL

Allan, Wm. T.
Allen, W. Harwell
Armstrong, Walter J.
Arnaiz, Walter P.
Atkinson, George K.
Austin, Richard S.
Austrom, Charles A.

Baker, Norman L.
Ballard, Frederick W.
Baumgartner, Arthur A.
Baxter, Henry N.
Beard, Theodore H.
Bechtel, John A.
Benjamin, Merrill G.
Bensamon, Edmond
Benson, Robert F. A.
Bergstrom, H. E.
Bertsch, John C.
Bettis, Wm. I.
Binckes, F. J.
Borden, John M.
Bowman, Robt. B.
Boyd, William C.
Boyer, Frederick Q.
Brady, George S.
Brooke, Wm. Clement
Brown, Edwin H.
Bruff, Chas. L.
Bryan, Artis C.
Buell, Maurice L.
Burns, Herbert A.
Bussey, Chas. C.

Cahill, Anthony M.
Carew, Wm. A.
Carlson, Carl T.
Carpenter, Chas. U.
Chase, Wm. W.
Chadbourne, John L.
Chrustense, James C.
Clark, Frank S.
Clark, James G.
Cochrane, Robert B.
Colby, Clyde W.
Compton, Ralph O.
Cook, Henry P.
Corbett, William B.
Cragg, Walter S.
Crowder, Carl G.
Crute, William R.
Curley, Robert S.
Curly, Raymond E.

Davison, Clarence M.
Dedrick, Benjamin W.
Dietrich, Fred C.
Doron, William H.
Driver, Arthur
Duffy, Owen
Duncan, George W.
Dunton, Philip R.
Duram, Arthur E.

Edwards, Victor E.
Estwing, Ernest O.
Evans, Herbert W.
Eyre, Thomas T.

Flynn, Charles A.
Fritts, Charles E.
French, Edward V.
Fuller, Floyd M.

Galloway, Charles D.
Gants, Elwyn T.
Garrison, W. L.
Gelder, John T.
Gibson, Charles D.
Gildersleeve, Frank M.
Gilliam, Thomas B.
Gladfelter, Herbert S.
Glasgow, Carr L.
Glass, William Clement
Goedkoop, Walter C.
Goldrich, Philip
Gooley, Joseph E.
Guthrie, Robert G.

Haller, Winfield A.
Hamilton, James V.
Hammond, Myram H.
Hammond, Richard
Hawes, Alex. G.
Hargrave, Hugh H.
Hayward, Sterling F.
Henning, Charles F.
Henningson, Louis A.
Henry, George J.
Hobson, Russell B.
Holt, Herbert F.
Hook, James W.
Horton, Charles M.
Horton, Marshall G.
Hubbell, Arthur C.
Hull, Foster J.
Hume, Walter E.
Hunt, Harry B.
Hunt, William F.

Isenberg, Martens H.

Jacobs, Adolph
Jennens, Arthur E.
Johns, Edward F.

Kales, William R.
Kammerhoff, H. H. M.
Kaspar, Joseph J.
Kastler, Edward L.
Keely, Royal R.
Kemp, Francis I.
Kenyon, Alfred L.
Key, James F.
Kraut, Hans B.

La Foun, Alphonse
Lapat, Leopold
Lawrence, Samuel E.
Leary, Frank J.
Leigh, Robert E.
Leonard, Albert P.
LeValley, John R.
Lipsner, Benjamin B.
Loewenstein, L. C.
Long, L. Guy
Ludemann, John E.
Lunn, John A.
Lyon, Howard B.
Lyon, Tracy

McCabe, John C.
McCarte, Alexander J.
McFarlan, Edward
McLean, Alva W.
Macdonald, J. W. F.
Mackie, Daniel M.
Magie, William F.
Maitra, Krishna M.
Marshall, Wm. A.
Mayo, William B.
Mead, Richard R.
Melendy, Jesse G.
Menges, T. C.
Menzin, Abraham L.
Meyncke, George M.
Miltenberger, George K.
Misostow, Henry
Moody, William F.
Morris, John E.
Morrissey, John M.
Morse, Walter R.
Mosman, Ernest
Moulton, Seth A.
Mulliner, Richard H.
Murphy, James A.

Nadler, Harry A.
Nailler, Raymond F.
Nicol, John Oederlin Frederick

Parsons, Frederick A.
Paulson, Peter A.
Piccard, J. E.
Pohle, Walter B.
Polk, Anderson
Pollard, Wright
Porter, Finley R.
Pryor, Willard L.

Quinn, L. R.

Ralph, J. J.
Rascovich, M. B.
Real, Geo. F.
Reeve, Sidney A.
Reynolds, Geo. D.
Richards, Arthur
Rigdon, Carl
Riggs, George
Roos, Delmar G.
Royal, James M.
Ruebel, C. A. E.
Ryan, E. F.
Ryder, Earl R.

St. Lawrence, John
Sawyer, Harry S.
Schlitz, Bernard P.
Schreck, H.
Schubart, Frank H.
Schulhoff, Saul
Seaman, Frank W.
Seigle, William R.
Selindh, Herbert S.
Shaffner, Charles R.
Shields, Frank S.
Sibley, Mark M.
Skinner, Ramsey
Slaughter, Benjamin G.
Slocum, Myled S.
Smith, Harry R.
Smith, Preston, M.
Smith, Thomas W.
Squire, Milford B.
Stamer, Frank R.
Stevens, Ray P.
Stevens, William N. (N. Y. C.)
Stimmel, Virgil B.
Stolberg, E. C.
Stovel, Russell W.
Stults, William R.
Sweeney, Morgan L.
Syska, Adolph G.

Talbot, Clifford
Taylor, Cecil H.
Thomson, John
Tompkins, Harold D.
Trefz, Julius J.
Troth, Howard P.
Turner, Wm. C.
Tuvin, Julius H.

Uehling, Edward

Vallance, Alexander
Van Fleet, Herman
Van Keuren, Edgar B.

Walbridge, Arthur H.
Walsh, Francis S.
Warburton, Robert L.
Warren, William H.
Wartenweiler, Otto.
Weston, Samuel C.
Wilbur, Ralston T.
Wilkie, Donald C.
Willard, James A.
Williams, N. N.
Williamson, Charles S.
Wilson, James Aiken
Wilson, James Andrew
Wintzer, Rudolph
Woobank, Wilfred
Wood, Benjamin F.
Wood, Roland T.
Woodward, Hiram W.
Wolfolk, William G.

Yager, John E.
Zimmerman, James J.

ADDRESS UNKNOWN

Anderson, Herbert W.
Ballou, J. Ladd.
Barker, Ernest S.
Behr, Francis J.
Bergstrom, Harry E.
Blank, Bernard
Brown, John W. Jr.

Chapin, Harry A.
Church, F. O.
Clemons, Robt. S.
Cutler, James B.

Drew, William N.

Felker, Geo. F.
Fisher, Robt. R.

Gallaher, Charles W.
Garrett, Seymour S.
Greene, Isaac C.

Haines, Philip G.
Hall, Charles A.
Harmon, Harry T.
Hart, Howard P.
Harvey, Walter O.
Haynes, Charles A.
Heileman, Frank A.
Hite, Hugh D.
Howard, Henry S.
Hughes, James W.

Johnson, Joseph B.

Kinder, J. J. de
Kirsch, James L.
Kugel, H. K.

Lake, Charles W.
Lawrence, Schuyler
Lease, Leonard J.
Lewis, J. Clifford
Lincoln, Howard A.

McLundie, Archibald S.
Macdonald, Howard D.
Marrow, George P.
Matthew, Robert M.
Moore, Charles C.
Moyer, Will D.

Nolan, M. Wm.

Owen, Richard L.

Penney, Charles F.

Randall, John A.
Robb, Charles A.
Rose, David

Sawford, Frank
Schmidt, John D.
Scott, Rossiter S.
Scrugham, James G.
Shaw, Joseph D.
Sticksel, C. P.
Sullivan, Frank A.

Thornhill, Theodore W.

Vander Willigen, T. A.

Weakley, Floyd L.
Wheeler, Fred B.

Youngbluth, R. O.

Zach, Louis M.
Zink, Robt. E.

Society Affairs Section for November, Ordinarily issued as Section 2 of Mechanical Engineering

Volume 41 Number 11

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MECHANICAL ENGINEERING

THE JOURNAL OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

A. S. M. E. Affairs

NOVEMBER-1919

PUBLISHED MONTHLY BY THE SOCIETY
29 WEST 39TH STREET, NEW YORK, U.S.A.

Coming Section Meetings

Atlanta Section: November 25. Place and subject to be announced.

Cleveland Section: November 25. In the rooms of the Cleveland Engineering Society, Roof Garden, Hotel Statler. Subject to be announced later.

Daily luncheons are served to members and guests (ladies invited) in the dining room of the Cleveland Engineering Society, Hotel Statler.

Connecticut Section and New Haven Branch: November 19. Joint meeting at the Mason Laboratory, Yale University. Subject: Transportation, Steam, Electric, Motor-truck, etc.

Indianapolis Section: Every Thursday, luncheon meeting at the Scientech Club.

Minnesota Section: November 3. At the Mid-Way Branch, St. Paul Chamber of Commerce. Subject to be announced.

New Orleans Section: November 10. At Louisiana Engineering Society. Subject to be announced.

San Francisco Section: Every Thursday, luncheon meeting at the San Francisco Engineers' Club.

Annual Meeting Hotel Reservations

Those expecting to attend the Annual Meeting are urged to arrange *now* for accommodations in the city during those days. Hotels are crowded almost beyond capacity and there will be small chance of obtaining rooms unless secured long in advance. The following is a partial list of the hotels of the city with their addresses.

Again *make sure of your accommodations and do it now!*

HOTELS	ADDRESS
Algonquin	59 W. 44th St.
Ansonia	Broadway & 73rd St.
Astor	Broadway & 44th St.
Athens	30 E. 42nd St.
Brevoort	5th Ave. & 8th St.
Belmont	42nd St. & Park Ave.
Belleclaire	Broadway & 77th St.
Berkley	170 W. 74th St.
Biltmore	43rd St. & Madison Ave.
Breslin	Broadway at 29th St.
Bretton Hall	Broadway & 86th St.
Bristol	124 W. 49th St.
Broadway Central	673 Broadway
Broztell	3 East 27th St.
Buckingham	50th St. & Fifth Ave.
Claridge	Broadway & 44th St.
Clendening	202 W. 103rd St.
Collingwood	45 West 35th St.
Commodore	Lexington Ave. & 42nd St.
Cumberland	Broadway & 54th St.
Endicott	Col. Ave. & 81st St.
Flanders	135 W. 47th St.
Gotham	Fifth Ave. & 55th St.
Grand	Broadway & 31st St.
Great Northern	118 W. 57th St.
Gregorian, The	40 W. 35th St.
Hargrave	112 West 72nd St.
Herald Square	116 West 34th St.
Holland House	Fifth Ave. & 30th St.
Holley	Washington Square
Imperial	Broadway & 31st St.
Knickerbocker	Broadway & 42nd St.
Lafayette	University Place & 9th St.
Longacre	157 W. 47th St.

HOTELS	ADDRESS
Lorraine	5th Ave. & 47th St.
Lucerne	Amsterdam & 79th St.
McAlpin	Broadway & 34th St.
Majestic	Central Park West
Manhattan	Madison Ave. & 42nd St.
Marie Antoinette	Broadway & 67th St.
Martinique	56 West 33rd St.
Murray Hill	Park Ave. & 41st St.
Navarre	7th Ave. & 38th St.
Netherland	5th Ave. & 59th St.
New Weston	31 East 49th St.
Nobleton	126 West 73rd St.
Park Ave.	Park Ave. & 33rd St.
Pennsylvania	33rd St. & 7th Ave.
Plaza, The	5th Ave. & 59th St.
Prince George	14 East 28th St.
Richmond	70 West 46th St.
Ritz-Carlton	Madison Ave. & 46th St.
San Remo	Central Park West & 74th St.
Savoy	5th Ave. & 59th St.
St. George	51 Clark St., Brooklyn
St. Regis	5th Ave. & 55th St.
Seville	Madison Ave. & 29th St.
Seymour	44 West 45th St.
Somerset	150 West 47th St.
Touraine	23 Clinton St., Brooklyn
Vanderbilt	Park Ave. & 34th St.
Waldorf-Astoria	34th St. & 5th Ave.
Wallick	Broadway & 43rd St.
Wellington	7th Ave. at 55th St.
Wolcott	4 West 31st St.
Woodstock	127 W. 43rd St.
Woodward	Broadway & 55th St.
York	7th Ave. & 36th St.

Annual Meeting Papers

The following is a partial list of the papers to be presented at the Annual Meeting, December 2 to 5, 1919, which will be printed in advance in pamphlet form. Members desiring advance copies of these papers may obtain them without cost as long as the supply lasts, by checking the papers desired, writing name and address and sending this blank to the Secretary. These papers will all appear in abstract form in the coming issues of Mechanical Engineering.

Common Errors in Designing and Machining Bearings, C. H. Bierbaum.

Turbo-Compressor Calculations, A. H. Blaisdell.

A Perfected High-Pressure Rotary Compressor, C. B. Lord.

Modern Electric Furnace Practice as Related to Foundries in Particular, W. E. Moore.

Scientific Development of the Steam Locomotive, John E. Muhlfeld.

An Investigation of Strains in the Rolling of Metal, Alfred Musso.

A New Type of Hydraulic-Turbine Runner, Forrest Nagler.

Appraisal and Valuation Methods, David H. Ray.

Kerosene as a Fuel on High-Speed Engines, L. F. Seaton.

Oil Pipe Lines, S. A. Sulentic.

Lubrication of Ball Bearings, H. R. Trotter.

Thread Forms for Worms and Hobs, B. F. Waterman.

Octaval Notation and the Measurement of the Binary Inch Fractions, Alfred Watkins.

Motor-Transport Vehicles for the U. S. Army, John Younger.

Air Pumps for Condensing Equipment, F. R. Wheeler.

Please send me the papers checked above.

Name.....

Address.....

Publications Delayed by Labor Conditions

The printers in New York City have been involved for the past month in the most serious strike probably in the history of the industry. On September 30 the pressmen and feeders in all the union plants, with the exception of newspaper offices which are operating under another arrangement, walked out and were followed shortly by the compositors, who left on a "sympathetic vacation."

MECHANICAL ENGINEERING, in common with nearly all the technical and general periodicals of the city, has in consequence been unable to have work done except by outside printers. In only a few instances have any magazines been issued from New York City during the past month.

It is the intent of this Society, however, to serve its membership and the readers of MECHANICAL ENGINEERING to the fullest extent possible, even under these adverse conditions. There is now issued herewith the usual Section Two of MECHANICAL ENGINEERING for the November number, containing Society Announcements, the Employment Bulletin and other timely and important matter relating to Society Affairs.

Later in the month the technical or main section will be published, containing abstracts of Annual Meeting papers, the Engineering Index, Engineering Survey, etc. This section is now being printed outside of the city. It is hoped that matters will be adjusted in time so that the December number can again be printed in the usual way in New York.

Society Affairs

Affairs of Interest to the Membership—Secretary's Letter—Among the Local Sections—Executive Committee Notes—Employment Bulletin—Candidates for Membership

The New Vision

DURING the month all of the reports of the Committees on development of the National Engineering Societies will probably have been presented to their respective boards of government.

The spirit that has actuated the respective committees during these months of introspection has been that of discovering in what way the Engineer may better fulfill his mission (and we all have a special function to perform in life), and then to recommend to the societies how these new responsibilities may best be undertaken.

Institutions, notably all of the churches and many of the colleges, are at the present time making drives for endowment funds. In several cases the returns have already exceeded the goals set up by committees. We may therefore expect similar "drives" by the Engineering Council, the American Engineering Standards Committee, the National Service Committee, Engineering Foundation and other activities in which we participate, and it will become the duty of the engineer to put the question to himself, "Have I a part in these broader movements of my profession?"

It is obviously necessary to ask the practical question, "Shall we, in order to undertake these altruistic activities, cut down the professional and technical activities now being carried on by the Societies or shall we continue with the same efficiency the various technical activities such as standardization work, research, etc., and undertake relations with the public in addition?" This is a vital matter. Perhaps it will be wise to put it to a vote and then with democracy have the minority agree to abide by the will of the majority. It is well known to many of those active in the engineering societies that these organizations have all but succumbed in the endeavor to maintain their customary activities and at the same time contribute to the ever-increasing joint undertakings in public affairs. Those not familiar with current conditions I will ask to accept this statement without further data. The mounting costs of the publications which are issued have alone consumed all the margin.

Therefore, I definitely recommend that the societies gradually cease supporting or attempting to support the broader joint activities and that these activities in public affairs be financed by separate and distinct additional subscriptions. My own hope is that the majority of the members will feel that if they are to get the benefit of their participation in public affairs, it is essential to make sacrifices. No development can take place without sacrifice. If this be true, then each of us must make a subscription and a substantial one, not only of money but of thought and time.

In order that each one may get the full benefit he must contribute until he feels it. A contribution of "loose change" is of no particular benefit to the giver. It must be an absolute sacrifice in order for the giver to obtain benefit. Not that the sums contributed from "loose change" may not be usefully and beneficially employed, but if the one who does the giving is to derive the benefit, it must be by virtue of sacrifice on his part. Therefore, when these several appeals are made, and they must be made if the work is to be done, each man must select which of these activities he will support. Assuming, as is possible, that he will not feel able to contribute to them all. Some can and should contribute to all. All are worthy and there are more activities which, with our growing participation in affairs, we shall discover ought to be undertaken. It is only in this way that we shall place the profession before the world as we dream that it should be.

CALVIN W. RICE,
Secretary

Executive Committee Notes

A meeting of the Executive Committee of the Council was held in the rooms of the Society on October 11, 1919. There were present: President M. E. Cooley, *presiding*, Charles T. Main, Ira N. Hollis, Henry B. Sargent, D. S. Jacobus, by invitation, Major Fred J. Miller, nominee for president, and Calvin W. Rice, *Secretary*.

The following actions were taken, subject to the later approval of the Council:

Resolutions on Death of Mr. S. T. Wellman. The following committee appointed by the President on resolutions on death of Mr. Wellman, Past-President of the Society, was confirmed: C. F. Brush, *chairman*, R. W. Hunt, C. S. Howe, S. H. Pitkin, Ambrose Swasey.

Nomination for Council Vacancy. The nomination by the Regular Nominating Committee of Mr. C. E. Lord, Mr. L. E. Strothman, alternate, to fill the Council vacancy caused by the resignation of Mr. F. E. Geier, was received. On account of the death of Mr. Lord, Mr. Strothman's name was accepted and ordered placed on ballot.

Meetings and Program Committee. On account of the considerable increase in the cost of publishing Transactions, it was voted to call the attention of the Committee on Publication and Papers to the possibility of publishing certain papers in the Transactions in abstract and of referring inquiries to the "Archives of the Society" for the complete paper.

Conduct of Meetings. A committee of three was authorized to draft rules for the conduct of meetings of the Society or its Sections, the committee to take into account the existing rules.

Standardization Committee. The President reported the appointment of Prof. William H. Kavanaugh, to serve for five years and to fill out the unexpired term of Mr. W. S. Twining.

Pipe Threads Committee. Credentials were authorized to the following technical advisors to the representatives of the Society at the International Conference on Pipe Threads, named by the A. S. M. E. Committee on Pipe Threads:

Messrs. Stanley G. Flagg, Jr. J. E. Stark
C. D. Terry B. H. Blood
T. Patterson F. H. Moorhead
A. M. Houser

Calvin W. Rice,
Secretary

Notes of the Month

The report of the Special Committee on Aims and Organization of our Society, together with the report of the Joint Development Committee of the Founder Societies, is being presented to the Council at its meeting in Indianapolis. If these reports are accepted at that time, they will be put in type immediately for distribution to the membership. The reports are to be presented to the Society as a whole at the Business Session of the Annual Meeting on December 3, and members desiring to do so may contribute written discussion in advance of the general meeting.

Mr. Calvin W. Rice has been chosen by the Post-War Committee on Architectural Practice of the American Institute of Architects to represent the engineering profession at an interprofessional conference to be held in Detroit, Mich., November 28 and 29. The following gentlemen representing various other professions have also been selected for this conference: Dr. Felix Adler, Dr. Chas. A. Beard, Chas. A. Boston, Henry W. Hodge, Thos. R. Kimball, Dr. Alex Lambert, Arthur D. Little, Basil M. Manly, Dr. Geo. A. McKean, E. J. Mehren, Frank A. Waugh, Frederick L. Ackerman, N. Max Dunning, Robt. D. Kohn, Milton B. Medary, Jr., C. H. Whitaker.

Prof. D. S. Kimball has been visiting some of the student branches in the East and Mid-West districts.

As we go to press with Section Two of the November issue, registration opens for the joint meeting of the mid-west sections at Indianapolis on Friday and Saturday, October 24 and 25. This meeting promises to be one that will set a high standard for future meetings as regards both timeliness and interest of the topics. The meeting is under the auspices of the Indianapolis Section and no detail has been overlooked in providing for the comfort and welfare of the large number expected to attend. Other sections taking an active part in this meeting are Birmingham, Chicago, Cincinnati, Cleveland, Detroit, Milwaukee and St. Louis.

War Service Records

Out of 1500 members of the Society engaged in active military or naval service in the war, 780 have returned their War Service Records to date. All who performed such service but who have not yet received or returned a record form, are requested to communicate with the Secretary as early as possible, in order that the Committee on War Service Records may complete its arrangements for the Memorial Service in conjunction with the Annual meeting next month.

Major FRED J. MILLER, *Chairman*
Committee on War Participation and Members' Memorial

ANNUAL MEETING

A Varied Program with Addresses on the Industrial Situation in Relation to Present Conditions, a Discussion of Industrial and Railroad Valuation, and Technical Papers on a Wide Variety of Subjects

PLANS are practically complete for the Annual Meeting to be held in New York, December 2 to 5. The Committee on Meetings and Program has arranged a program of great interest and wide application, and besides the several general sessions which will be held as designated, the following major topics will be discussed:

Industrial Relations. Keynote session on the general subject of the Industrial Situation in Relation to Present Conditions, with the following papers and addresses:

WAGE PAYMENT, A. L. DeLeeuw, Consulting Engineer.

RIGHTS OF WORKERS, Frederick P. Fish, Chairman, National Industrial Conference Board.

SYSTEMS FOR MUTUAL CONTROL OF INDUSTRY, Wm. L. Leiserson, formerly Chief, Division of Labor Administration, Working Conditions Service, U. S. Department of Labor.

PROFIT SHARING, Ralph E. Heilman, Professor of Economics and Social Science, Northwestern University.

Power Plants and Fuels. This session will include, among other subjects, papers on boilers and fuels, constituting a continuation of the discussion of the subject of fuels in which there was so great an interest at the Spring Meeting at Detroit.

Appraisal and Valuation Methods. Many members have expressed a desire for a consideration of appraisal and valuation methods at a meeting of the Society. This is a subject, also, in which the members of the American Society of Refrigerating Engineers are particularly interested at this time, and a joint session with this Society has been arranged, at which there will be papers and a discussion of valuation and appraisal methods.

Machine-Shop Practice. Papers will be offered by the Sub-Committee on this subject, of interest to all who are engaged in the production of machinery.

Transportation. One session will be devoted to papers and discussion on locomotive development and motor trucks.

Internal-Combustion Engines. Papers on heavy-oil engines and gasoline engines will be contributed by the Gas Power Sub-Committee.

The Annual Meeting will open, as usual, with the presidential address and reception on Tuesday evening, December 2. On Wednesday evening there will be a meeting devoted to the work and achievements accomplished by the historic DeLamater Iron Works of New York City and by John Ericssor, the machinery for whose *Monitor* was built at this plant. This is the thirtieth anniversary of the death of DeLamater and Ericsson and it is proposed at this time to erect a tablet on the site of the old DeLamater Iron Works.

On Thursday evening there will be a social function arranged by the Local Committee of New York for the entertainment of those in attendance at the meeting. Altogether the meeting promises even to exceed the success of the last two annual conventions at which there were record-breaking attendances. Provision is being made by the Local Committee to look after the interests of those who are to attend, including hotel arrangements, which are so important at this time when there is overcrowding in nearly all the large cities.

On page II of this Section is given a partial list of the papers to be presented, and any desiring the complete papers in advance are requested to return the blank with the papers checked. The first, or technical, section of the November issue of MECHANICAL ENGINEERING will be issued about November 15, in which abstracts of a large number of the papers will be published, and these, it is believed, in most cases will meet the needs of those who desire to discuss the papers.

Local Sections Development

THE first Sections were established in 1909, at St. Louis and Boston. It was not until 1915 that the Committee on Local Sections was established. At that time there were eight Sections, and the annual appropriation was $3500 for Sections' meetings. When the Committee on Local Sections began its work there was little information available to guide them. Therefore, one of the first things undertaken was a study of conditions obtaining in each of the various centers, both where Sections were established, and at other places where their formation was apparently desired by the members. As a result of the painstaking thought and persistent effort of the Sections Committee combined with the enthusiasm and devotion of the leaders in the several groups, the Sections have grown to 29 in number, of which one is a State Section with five branches. The annual appropriations have grown so that for the coming fiscal year (1919–1920), it is planned to provide $23,000 and these Local Sections now provide meetings for members of the Society in no less than in 33 cities throughout the United States.

The personnel of the Committee is as follows:

D. Robert Yarnall, *Chairman*, member of the firm of the Yarnall-Waring Company, Philadelphia; member of Council, Manager of the Society. Served since 1912.

James A. Hall, Assistant Professor of Mechanical Engineering, Brown University, Providence, R. I. Served Spring of 1919.

Charles Russ Richards, Dean of the Colleges of Engineering, Director of the Engineering Experimental Station, University of Illinois; member of Council, Manager of the Society; member of the Sub-Committee on Fuels of the Power Test Code Committee. Served since 1917.

Louis C. Marburg, Secretary-Treasurer of Marburg Brothers, Inc., New York, N. Y., Chairman of the Committee on Aims and Organization. Served since 1912.

Sumner B. Ely, Secretary-Treasurer of the Chester B. Albree Iron Works Co., Pittsburgh, Pa.; member of the Committee on Aims and Organization. Served since 1918

Professor W. H. Kenerson was appointed in January 1919, by President Cooley, to serve for two years, and during his absence in France, Prof. James A. Hall substituted.

Those who have served on the Standing Committee in the past are the following: Elliott H. Whitlock, of Cleveland; chairman from 1912 to 1916; W. F. M. Goss, then of the University of Illinois; Walter Rautenstrauch, of Columbia University, and Henry G. Sargent of New Haven.

A. S. M. E. Policy Regarding Local Sections

The following statement of policy relating to the establishment of Local Sections, their relations to the local societies, and the conduct of their activities has been approved by the Local Sections Committee of the A. S. M. E. and expresses the spirit of helpfulness and coöperation which it is desired to promote.

1 Every professional man, engineer, chemist, architect, etc., should be encouraged, and in fact told, that it is his duty to be a member first of the local general engineering society in the community in which he lives.

2 As each professional man develops professionally and financially to the point where he can undertake membership in a national society he will obviously join that society which best meets his specialty.

3 Within the local professional society there shall be sections organized for as many different groups of the professions as are represented in that community.

4 The respective chairmen of these sections shall have a seat either by election or ex-officio, on the board of government of the local society, thus encouraging a broad management of the Society.

5 Those members of the local society in any section of that society who are also members of a corresponding national society shall proceed to call a meeting of all the members of that national society in that locality and form a local section of that national society and propose its affiliation with the local society. The above shall all be done with the intent to make the local society the clearing house for all professional activities of the local and national societies, all working toward the highest degree of coöperation and for the general advancement of the engineering professions in that community. Each national society shall strive to assist and develop and do its share of the work of advancing the interests of the engineering professions under the general initiative of the local engineering society. However, the identity and individuality of the local societies and of their sections shall be scrupulously maintained all the while that they are coöperating with the national societies.

6 A method of arranging meetings would be as follows: Once a month the local engineering society should have a general meeting under its auspices to which all members of every society would be invited. On the other weeks or days of the month, according to the ambitions of the respective sections, there would be in turn, the separate sections' meetings presided over by the respective officers of those sections. In general, there would be invitations to each of these meetings issued to every member of the local society and of each section.

7 A paid secretary of the local society, common to all the societies, can then be engaged to handle clerical matters, issue notices, arrange for meetings, etc. As a broad policy the principal aim of the local society would be for its members to devote their talents to the general good of the community by discussion of the technical features of local government, *i. e.*, discussion as in Cleveland, of the straightening of the Cuyahoga River and of whether or not there should be a one-deck or a double-deck bridge; as in St. Louis, the discussion of the new $23,000,000 bond issue, most of the projects of which are of an engineering nature; in Erie, on the development of the port facilities, etc. Obviously, incidentally and more frequently, perhaps, there would be technical subjects of special interest to the members; but the underlying feature would be that the greatest success of the profession, and obviously of the local societies and their sections, would be attained when the emphasis was put on service to the community in distinction from the former point of view where almost the entire efforts of professional societies have been devoted to affairs strictly within the professional needs of the members of the profession.

New Sections

During the so-called Sections' Year, ending June 30, 1919, seven new Sections were established, making an increase of 33½ per cent. These new Sections were formed at Cleveland, Washington, Eastern New York (including Albany, Troy, Schenectady and Watervliet), Rochester, the Mid-Continent Section (with headquarters at Tulsa, Okla.), Virginia Section (with headquarters at Richmond), and a Colorado Section (with headquarters at Denver). Since July first, the members at Houston, Tex., Portland, Ore., and Seattle, Wash., have organized sections.

The members in a number of other cities are considering the formation of Sections. To assist members who desire to organize, as well as to clarify the position of the Society with regard to the establishment of Local Sections at centers where local engineering societies are established, a more detailed statement than that given above is being prepared which will be distributed to those interested. Also officers of the Society will arrange to visit such centers if the members will notify them when the subject comes up for consideration.

It is a notable fact that among the various Sections the same ideas are being discussed, the same projects being considered and brought before the public, but naturally enough by different methods. The reports of various societies show these topics to be of common and current interest. They include:

1 The value of coöperation.

2 Constructive legislation initiated by engineering societies.

3 Methods by which engineering societies may serve the community.

4 Ways and means of stimulating interest in meetings and increasing membership.

THE CLEVELAND PLAN OF ENGINEERING COÖPERATION

One of the most important developments of the year was the acceptance of the so-called "Cleveland Plan" whereby a temporary agreement was made providing for trial period of one year of a joint initiation fee and dues for members of both the Cleveland Engineering Society and our Society. Mechanical engineers not members of either society but applying for joint membership pay an entrance or initiation fee of $25, $18 of this going to The American Society of Mechanical Engineers and $7 to the Cleveland Engineering Society.

The plan further contemplates that members of The American Society of Mechanical Engineers may join the Cleveland Engineering Society without the payment of an entrance fee. On the other hand, those who are already members of the Cleveland Engineering Society may join The American Society of Mechanical Engineers after application and election in the usual and well-known way, by payment of the difference between the entrance fee of the Cleveland Engineering Society and the initiation fee of The American Society of Mechanical Engineers for the particular grade of membership sought.

For several reasons the plan could not well be given a more auspicious test. Prominent officials of the national societies, and particularly those of The American Society of Mechanical Engineers have heartily approved of the engineer's becoming an active force in public affairs and of technically-trained men unitedly serving the respective communities where they reside, as well as taking an earnest, helpful interest in national problems. Co-operation as engineers, regardless of their specialties, should repay in public service whatever is possible of their educational obligations.

Cleveland offers an excellent opportunity to test out the idea. Their local engineering society is very strong and has a membership of over 1200. It maintains all the facilities of a club, is open every weekday, has regular and frequent meetings for all branches of the engineering professions, keeps a critical eye upon all local transactions of consequence to engineers and energetically works in team style with the Cleveland Chamber of Commerce and with other leading civic forces.

One naturally assumes that such a plan may easily lead to other and similar arrangements between national as well as local engineering societies. So promising is the project that we hope for it an abundant measure of success.

THE YEAR 1918–1919

In the early portion of the season the work of the Sections was practically at a standstill, due to the combination of the war and the influenza epidemic, and it was not until after the Annual Meeting that the work really got under way. Such excellent progress was made, however, that the Season's activities compare favorably with any that preceded it.

Besides the many accomplishments of Sections reported elsewhere in this issue reference should be made to the work of the Committee on Aims and Organization which was composed almost entirely of representatives from Sections and which has rendered what is in many respects the most progressive report ever made to the Society. Another advance step has been in the amendment to the Constitution which places the responsibility for the selection of the Nominating Committee of the Society.

THE SEASON 1919–1920

The activities of the Sections begin this year with meetings regularly held at 35 cities, and eight of these planning a joint two-day session in October. President Cooley, Past-President Hollis, Dexter S. Kimball, Chairman of the Meetings Committee, and Prof. James A. Allen, in charge of the Research work of The American Society of Heating and Ventilating Engineers have all agreed to visit Sections of the Society during this season.

It is hoped to have at least one of these gentlemen visit every Section throughout the United States. The council will again go to one of the Sections to hold its October meeting, thus showing its interest in the Joint Section Meeting at Indianapolis. With these activities, supplementing a general acceleration of interest on the part of Sections in all parts of the country, the Society promises to make progress in many directions before the season draws to a close next June.

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications and positions listed below combine the services of the Society and of the Engineering Societies Employment Bureau, on the sixteenth floor of the Engineering Societies Building

POSITIONS AVAILABLE

Stamps should be inclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society records.

SALESMAN with some technical knowledge relating to small tools; some executive ability and energy and willing to start as salesman with possibilities of district management if he makes good. State age, education, technical experience and training, territory preferred and salary desired. Replies confidential. R-1656.

LECTURER IN MACHINE DESIGN by the University of Toronto. Must be an engineering graduate, with at least two years' experience in actual machine designing after graduation. Teaching experience desirable. State experience, references and salary expected for seven months ending May first. R-1650.

LUBRICATION ENGINEERS. Two positions open to mechanical engineers with sales experience, for the Vacuum Oil Company, Bombay, India. Applicants should have a thorough technical education and experience. One man required with a number of years' experience in motive power department of large American or English railway system. The other man with several years' experience as mechanical superintendent or maintenance engineer in large flax, jute or other class of textile mill. Appointments will be made by letter only, giving age, training, experience and salary desired. Preference given to engineers of Scotch or English parentage. R-1653.

ENGINEER AND DESIGNER, experience in designing and building punches, shears, bending and straightening rolls, heavy presses and similar class of machinery. Must be high grade in every way. First class opportunity. R-1666.

MECHANICAL ENGINEER to take charge of work in shop management in well-known University, to have direct supervision of the machine shop and to introduce a system of cost accounting, etc., into all shops and laboratories in two large departments. Man preferred with practical experience along these lines and who is or will become recognized authority on this subject and capable of acting in a consulting capacity for commercial plants. Full history of education and experience must be given in application together with statement of lowest salary acceptable. R-1680.

MECHANICAL DRAFTSMEN, preferably with some experience in design and detail of elevating and conveying machinery. Experience in machine design essential. Technical education desirable. Salary for experienced men from $175 to $225 per month. Location forty miles from Chicago in community of about 40,000. R-1728.

MALLEABLE FOREMAN to become assistant superintendent, if ability is shown. Must have thorough molding experience and some knowledge of furnace operation and mixtures of iron. College graduate preferred. Excellent opportunity for man willing to work. R-1727.

DRAFTSMAN. Young mechanical engineer with one or two years' experience in plant layout, such as piping, heat coils, etc., for cottonseed oil refinery. Knowledge of building construction helpful but not essential. Write, stating age, education, experience and salary expected. Location, Virginia. R-1742.

MACHINE DESIGNER. A capable, thoroughly experienced, high-grade engineer, with several years' experience in the designing of labor-saving devices in industrial plants. Must possess initiative and have creative ability for making complete drawings of machines from ideas given him by production superintendents and foremen. We do not want a surprising expert, but a man able to do his own designing. To the one that can qualify an excellent opportunity is offered with every inducement for

future development. Give complete details of past experience, qualifications and salary expected in first letter. R-1743.

MILLING ENGINEER AND DRAFTSMAN; must have experience in flour milling; a milling engineer who is also a draftsman desired. Location Pennylvania. R-1615.

SQUAD BOSS IN ARCHITECTURAL AND STRUCTURAL WORK; must be capable of taking on executive work such as running jobs from both the architectural and structural viewpoints. Position will eventually lead to assistant in charge or to engineer in full charge of these departments. Location, Detroit, Michigan. Openings for one or two men. R-1618.

MECHANICAL DRAFTSMAN; should be a mechanical draftsman, with some architectural experience, and in addition to being technically trained, should have good judgment and common sense. Location, Georgia. R-1619.

SUPERINTENDENT FOR TOOL-MANUFACTURING PLANT; must be technical graduate and practical executive, with experience in accurate tool work, gages, jigs and fixtures; estimating heat treatment of steel, etc. Age 35 years. Location, Newark, New Jersey. Salary $3000 per year. Apply by letter giving references, experience, and salary desired. R-1620.

INDUSTRIAL ENGINEER, capable of laying out a modern lithographic plant; must understand not only lighting but also Sprague system of control, routing of work in process, etc. Location, Toronto, Canada. R-1624.

MARINE DRAFTSMAN must understand machinery installation, piping and valve work as applied to cargo ships. Location, Newark, New Jersey. R-1627.

DRAFTSMAN, must be thoroughly experienced in all-round work, having knowledge of machinery, structural steel, concrete, etc., for position in copper-smelting work. Location, Arizona. Several openings. Engagement for satisfactory men from eighteen months to two years. R-1629.

PILE-DRIVER SUPERINTENDENT to take charge of large floating pile driver which will handle concrete piles 110 ft. long and weighing 35 tons. Will also have charge of erection of pile driver, which is being fabricated in the United States and will be shipped late in October. Location, Philippine Islands. R-1630.

LOCOMOTIVE-CRANE OPERATOR able to handle an industrial works 40-ton locomotive crane. Location, Philippine Islands. R-1631.

MOTIVE-POWER ENGINEER. Young mechanical engineer possessing energy and ability of such quality that he can be developed to solve the many new problems now troubling motive-power departments of a number of railroads. Need not be a man of railroad experience, since man is wanted more for that into which he can be developed than for what he has already learned from experience in railway lines. Man 28 to 30 years old desired. Location, Southern Region. R-1633.

SALES ENGINEER, highest-type engineer with sales ability; desirable that man have had shop experience and be between 35 and 45 years old. Proposition is to sell scales. Will be given restricted territory in vicinity of New York City. Salary, on commission basis. Openings for several men. R-1634.

POWER DESIGNER, must be capable of designing complete steam, power and heating installations for factories and office buildings. Location, Delaware. Salary $250 to $300 per month. R-1635.

ENGINEER, for gas producer and combustion work. Must have technical training and some practical experience. Should be capable of conducting tests on gas-producer plants to determine gas quality, efficiency, etc. Should be 25 to 30 years of age and must have initiative and promise of development. Location, Delaware. Salary $200 to $250 per month. R-1636.

JUNIOR INVESTIGATOR, 25 years of age or over, technical education. Experience should be in general mechanical engineering, preferably textile. Should be well versed in operating experimental machinery already built. Duty includes study of requirements and devising improvements, testing filters, drying apparatus, pumps, air-conditioning apparatus, etc. Also doing sufficient bench work to rough out new devices and designing special machines, involving knowledge of cam movements, general electrical work, high-speed drives, hydraulics. Location, Delaware. Salary $150 to $250 per month. R-1637.

ENGINEER, on study of shop methods; experienced in the laying out of manufacturing units in manufacture of automobiles and in study of efficiency operations during manufacture. Calls for very high type of engineer with specific experience as quoted above. Technical education is desired and it is believed that at least six years of practical experience in line with the above is essential. Location, Delaware. Salary $350 to $450 per month. R-1638.

RECENT GRADUATE FOR EDITORIAL WORK. Education as metallurgical, mining or mechanical engineer and ability to write. Knowledge of type and makeup of magazines such as that gained in work on a college publication would be of advantage. Knowledge of iron and steel and machine-shop practice also desirable. Location, New York. Salary $25 per week. R-1639.

PORTAL-CRANE DESIGNER with experience on cranes used especially on wharves and piers. Location, New York City. R-1645.

ESTIMATOR AND DESIGNER with extensive experience in all types of building construction. Good opportunity. Location, Atlanta, Georgia. Salary $2500 per year. R-1662.

GEOLOGIST OR MINING ENGINEER with sufficient experience to make examination of large area and report upon the economic value of any minerals which may be found. This work will extend over a period of two or more years. Location, India. R-1660.

ASSISTANT ENGINEER with extensive experience in general manufacturing plant management. Must be over 30 years of age. Location, Ohio. R-1669.

STEEL-MILL ENGINEER with considerable knowledge of handling of materials and installation of rolling mills, heating furnaces, soaking pits, hydraulic forging press and accessory apparatus, run-off table, cooling beds and electric furnaces. Location, Ohio. R-1670.

DESIGNERS AND DRAFTSMEN with experience along the lines of general mechanical engineering for power-plant and blast-furnace plant construction, piping, heating and ventilating, elevating and conveying equipment, etc. Experience along any one of these lines should qualify man for position. Openings for 25 men. Location, Detroit, Michigan. R-1671.

GRADUATE CHEMICAL ENGINEER. Young graduate with chemical experience and executive ability. Location, New York. Salary $35 weekly to start. R-1677.

MECHANICAL DRAFTSMAN familiar with laying out of special machines, jigs, and tools. Opportunity depends entirely upon man. Location, New Jersey. R-1678.

INSTRUCTOR IN ELECTRICAL ENGINEERING. Graduate in electrical engineering qualified to serve as instructor, or assistant instructor, in the department of electrical engineering at a college. Prefer man with at least one year's practical experience since graduation, and of course, one who has the necessary personal qualifications which would tend to make him a successful teacher. Location, Pennsylvania. Two openings. The position would be permanent if the man made good. Salary offered depends upon qualifications of applicants. R-1681.

MECHANICAL DRAFTSMAN who is experienced in heating and plumbing work. Location, New York. R-1688.

INSTRUMENT MAN experienced in topographic surveying by the stadia method, for work on large irrigation project. Several openings. Apply by letter stating experience, salary desired and when available. Location, Montana. R-1690-a.

TOPOGRAPHIC DRAFTSMAN experienced in topographical work. Apply by letter, stating experience, salary desired and when available. Draftsmen should send samples of their work. Several openings. Location, Montana. R-1690-b.

CHEMIST, familiar with the making of alum for commercial purposes and capable of managing an alum factory. Location, Illinois. R-1694.

OPERATING ENGINEER with experience in sugar and power-plant work; also electrical work. Two months' vacation in states allowed with passage paid both ways. Single man furnished with board. Married man furnished with residence. Location, Porto Rico. Salary $2500 yearly. R-1698.

MACHINIST, single man; skilled machinist for maintenance on a sugar plantation. Location, Porto Rico. Salary $150 per month. R-1699.

INSTRUCTOR IN MECHANICAL DRAWING; must be technical graduate with some experience either in instructing or in general engineering work. Two openings. Location, Wisconsin. Salary depends on experience. R-1700.

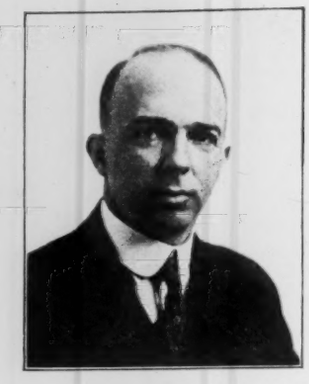
DRAFTSMEN with experience in conveying and elevating machinery used in crushing and mining plants. Openings for several men. Opportunity for advancement. Location, Ohio. Salary $150 to $200 per month. R-1702.

TOOL AND JIG DRAFTSMEN, first-class tool and jig experience or good detail experience. Several openings. Location, Massachusetts. R-1703.

DESIGNER experience on high-pressure, large power-station work. Man 30 to 40 years of age preferred. Location, New York. Salary $175–200 per month. R-1704, R-1705.

CIVIL OR MINING ENGINEER, who can use surveying instruments and can plot his own notes. Must have had one or two years in field. Man with coal-mine experience preferred. Opportunity for advancement will be good. Location, Pennsylvania. Salary $150 to $175 per month. R-1705.

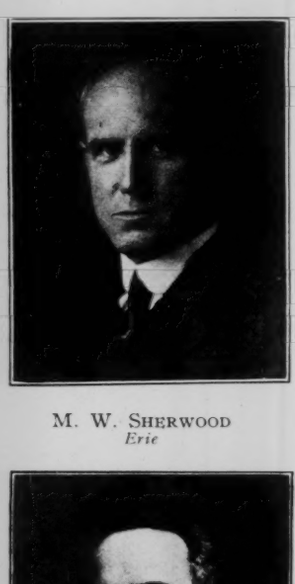
A. E. Walden
Baltimore



Paul Wright
Birmingham

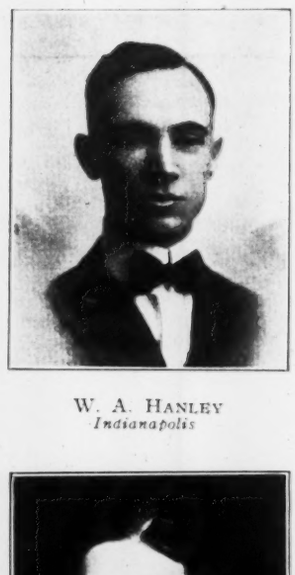
Elmer Smith
Boston

C. A. Booth
Buffalo



M. W. Sherwood
Erie

H. P. Maxim
Hartford



W. A. Hanley
Indianapolis

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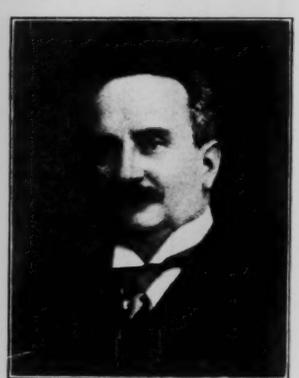
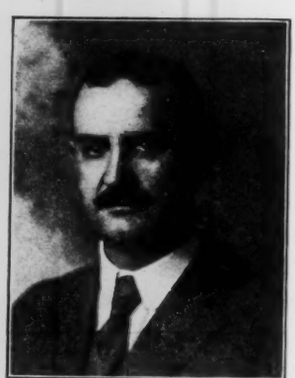


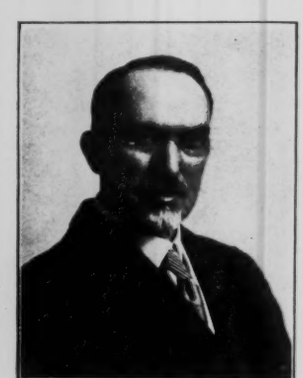
F. L. Mackintosh
New Haven



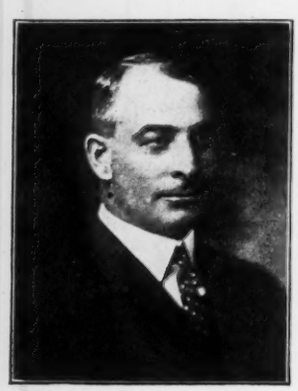
W. B. Gregory
New Orleans

W. W. Macon
New York

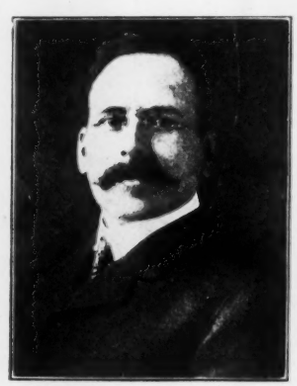
L. H. Kenney
Philadelphia



J. H. Stratton
Cleveland



T. L. Wilkinson
Colorado



H. G. Reist
Eastern N. Y.

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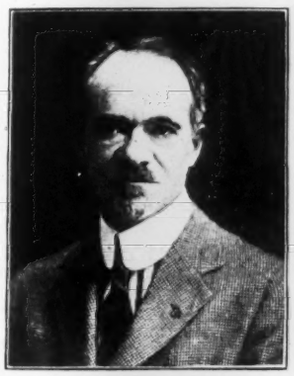
A. L. Rice
Chicago



H. M. Norris
Cincinnati

Arthur Brewer
Conn. and Bridgeport

F. H. Mason
Detroit

E UTIVE COMMITTEES
EC FOR 1919-1920

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of our Local Sections.
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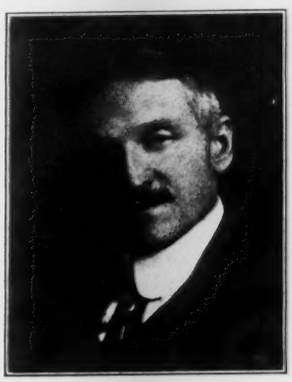
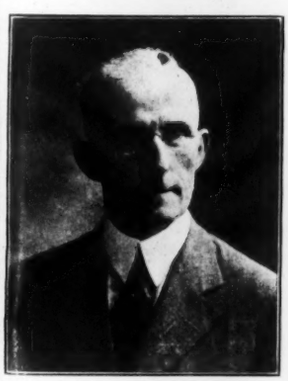
in ast year.

T. J. Royer
Los Angeles

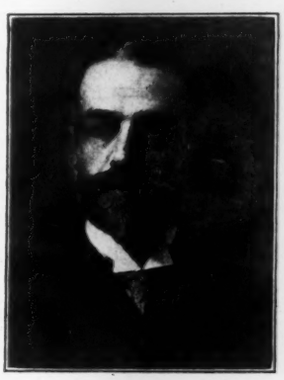


C. K. Decherd
Meriden

C. A. Cahill
Milwaukee

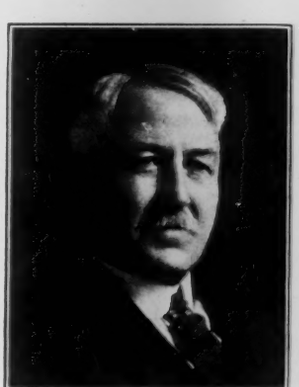


L. C. Nordmeyer
St. Louis



W. F. Durand
San Francisco

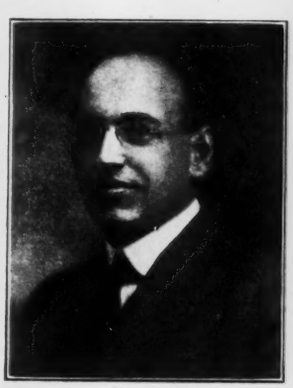
H. L. Thompson
Waterbury



H. P. Fairfield
Worcester

A N

H. P. Porter
Mid-Continent



V. M. Palmer
Rochester

S. W. Stratton
Washington

SUPERINTENDENT for power plant, with experience as superintendent of power plant to supervise operation of industrial power plant. Location, West. Salary good for qualified man. R-1706.

MECHANICAL DRAFTSMAN with general experience such as would qualify man for work in oil fields. Location, Tampico, Mexico. Salary depends on experience. R-1780-b.

STRUCTURAL DRAFTSMAN with two or three years' experience in structural design and detail work. Location, New York City. Salary $135 monthly. R-1710.

MECHANICAL DESIGNER, with tool, jig and fixture experience. Location, Newark, New Jersey. Salary $160 per month. R-1714.

INSTRUCTOR IN AUTOMOBILE MECHANICS, good general education preferably in technical or trade school. Previous teaching experience unnecessary although desirable. Must have practical experience and be especially strong in general automobile practice and be able to teach general automobile practice, mathematics, applied science, etc. Location, New Mexico. Salary $150 per month for nine months' service. R-1716.

MANUFACTURING EXECUTIVE with extensive experience in manufacturing line such as would qualify man to handle manufacture of plaster board; steel-mill experience of advantage. Location, Buffalo, New York. R-1718.

DEPARTMENT HEAD; mechanical engineer with paper-mill, board-mill, or steel-mill experience; capable of taking charge of department in paper mill. Location, Buffalo, N. Y. R-1719.

MACHINE DESIGNER, mechanical engineer with experience in machine design. Would be expected to design new machinery to cut down manufacturing costs in paper mill. Location, Buffalo, N. Y. R-1720.

MECHANICAL DRAFTSMAN with several years' experience in drafting room; will be given blueprints and sketches of machines with directions as to their arrangement upon the floor. From this information he will locate pulley connections, shafting and prepare all necessary details for field erection. The detailing of bins, spouts, chutes and parts thereof will also be required. Where machines require pipe connections for steam, water, oil or other purpose draftsman will be required to make necessary piping drawings showing connections and layouts and plans of pipe runs. Application should be made in writing, giving experience and references. Location, New York City. R-1722.

OPERATORS ENGINEER with ability to act as chief operating engineer of industrial power plant. Must be familiar with steam engines of all types, refrigerating machinery, air compressors and vacuum pumps. Man between 30 and 40 years of age preferred. Must have first-class New York City license. Excellent chance for right man. In replying give full details of education and experience. Location, Brooklyn, N. Y. R-1726.

ARCHITECTURAL DRAFTSMAN with several years' experience, capable of working without much supervision. Age 27 to 45 years. Location, Delaware. R-1729.

REINFORCED-CONCRETE DRAFTSMEN with several years' experience and capable of working without much supervision. Age 27 to 45 years. Location, Delaware. R-1730.

PLUMBING DRAFTSMEN with thorough knowledge of piping and plumbing and capable of working without much supervision. Age 27 to 45 years. Location, Delaware. R-1731.

POWER DRAFTSMEN with several years' experience on power-plant drafting and capable of working without much supervision. Age 27 to 45 years. Location, Delaware. R-1732.

ELECTRICAL DRAFTSMEN with several years' experience in drafting along electrical engineering lines. Must be capable of working without much supervision. Location, Delaware. R-1733.

MACHINE DESIGNERS, capable in this work with several years' experience in the design of machinery and capable of working without much supervision. Age 27 to 45 years. Location, Delaware. R-1734.

GENERAL ARRANGEMENT DRAFTSMAN with several years' experience in general layout of machinery and apparatus in factory buildings; capable of working without much supervision. Age 27 to 45 years. Location, Delaware. R-1735.

MECHANICAL DESIGNERS AND DRAFTSMEN with experience in design of small-movement work and fine mechanical apparatus as measuring instruments, meters, gages. Must be capable to act as leaders, supervising work of several draftsmen under their charge. Excellent opportunity for several men. Location, New York State. Salary depends upon the man. R-1741.

SALES ENGINEER; electrical engineer with illuminating engineering knowledge. Location, Michigan and Northern Ohio. R-1744.

PATENT MECHANICAL DRAFTSMAN with experience in preparing mechanical drawings for the United States Patent Office. Experience in connection with machinery for industrial plants desirable. Apply by letter, stating age, education, experience (in detail), salary expected and when available. Location, New York City. R-1746.

MECHANICAL DRAFTSMAN experienced on industrial car work. Several openings. Excellent opportunities for advancement, not only in salary but in position and opportunities. Location, Pennsylvania. R-1751.

MECHANICAL DRAFTSMAN. Desirable that man be acquainted with aeroplane work. Several openings. Location, New Jersey. R-1752.

POWER PLANT ENGINEER, M.E., with electrical experience, to work up details in office and field on turbine installations, steam piping, spray ponds and cooling towers. Location, New York City. R-1753.

MECHANICAL ENGINEER. This engineer will assume duties as a Technical Director. Must be mechanic and have special knowledge of locomotives and everything concerning railroads. Man who can speak Spanish and who is a Catholic (same religion as the people of Colombia) preferred. Apply by letter, giving age, education, experience and religion. Location, South America. R-1756.

PRODUCTION ENGINEER. Experienced shop man who has held at least minor executive positions in machine shops and with experience in modern methods of planning and production. Technical graduate preferred but man with suitable experience without a technical education would be accepted. Automobile manufacturing experience is very desirable but not essential. Should have pleasing personality and tact to get along with shop executives, as well as initiative and aggressiveness to undertake original work and carry through such work to completion. Several openings. Location, Michigan. R-1758.

SALES MANAGER with ability to organize sales office to sell electric lamps; man from Atlanta District desired; some experience in outside work, technical knowledge of lamp or technical education is not essential. Opportunity will be given the candidate to make himself thoroughly familiar with the lamp. Salary $150 to $200 per month. R-1759.

MECHANICAL ENGINEER as assistant secretary for service at National Headquarters. First requisite is sincere sympathy for interests of organization. Second, liberal education. Young man with pleasing personality and two to five years' experience in engineering practice, desired. Location, Middle West. R-1760.

MECHANICAL ENGINEER, capable man to fill position (now vacant) of mechanical engineer of the mechanical division, Panama Canal Service, Isthmus of Panama. Must be experienced engineer and capable executive and organizer. Responsible for immediate issuance of clear job order to working forces and for all details of operation of his office. R-1761.

MECHANICAL ENGINEER with general experience in all lines; knowledge of Spanish; sugar-machinery experience useful. Location, Peru. Salary $2500 first year and trip expenses. No expenses except for trip. R-1773.

FIRM OF CONSULTING ENGINEERS in New York City are in need of draftsman thoroughly familiar with ventilation of buildings. Communicate by letter only, giving in full, experience, salary expected, etc., to Meyer Strong & Jones, Inc., 101 Park Avenue, New York City. R-1226.

DISTRICT MANAGER with selling experience as well as varied engineering experience; must be an ex-service man who received salary of less than $4000 before the war. This man must be capable to grow into big job. Location, New York City. R-1779.

MECHANICAL DRAFTSMAN. Recent graduate in mechanical engineering to work in drafting room of firm manufacturing lawn mowers. Location, New York State. Salary $25–30 per week. R-1782.

YOUNG ENGINEER. Ability to organize and put in operation system for making graphs on data of production and other similar work. Must have draftsman's ability. Openings for several men. Location, Tulsa, Okla. Salary $150. R-1783.

SUPERVISING ENGINEER. Man thoroughly familiar with practical side of operating mechanical and electrical equipment of hotel building, to investigate conditions in the field and advise upon changes, alterations and maintenance necessary to improve conditions, by a hotel company operating large hotels in the eastern part of the United States. Location, New York State. R-1784.

MECHANICAL DRAFTSMAN. Experience in design of pumps and air compressors. Give full information regarding experience and salary desired. Location, Michigan. R-1785.

PRODUCTION ENGINEER for large silverware manufacturer, must be technical

graduate with at least five years' practical experience along production line. Experience with modern methods of scheduling, planning, routing and controlling production essential. Give age, complete details of education and experience and state salary expected in first letter. Location, Rhode Island. R-1786.

MECHANICAL ENGINEER with experience in compressed-air machinery, gas or oil engines. Preferably selling or business experience. Location, New York City. Salary $2000–2500. R-1787.

YOUNG ENGINEER. Recent graduate, single, with two or three years' experience in building construction. Duties will be inspection of installation of electrical and heating appurtenances, plumbing, etc., in building construction. Work to last one year. Location, West. Salary $45 per week. R-1788.

MILL-CONSTRUCTION ENGINEER. Young man with perhaps five years' experience in miscellaneous mill-construction work, to handle detail design and construction. Best of references as to character and ability must be available. Location, Delaware. R-1791.

DESIGNER AND DRAFTSMAN. Technical graduate, with experience on automatic machinery, as box-nailing machines and automatic feeders. Location, Brooklyn, N. Y. R-1794.

SHOP SUPERINTENDENT. Engineer with good technical training and thoroughly qualified in manufacture of textile-finishing machinery to act as shop superintendent. British birth essential, age 30 to 35 years. Location, England. Salary about $2500. R-1795.

ELECTRICAL ENGINEER, graduate, preferably, for position in technical library of large industrial firm. Good opportunity for right man to develop technical current news service already installed. Reading knowledge of French and German highly desirable. State education, experience and salary expected. Location, New York State. R-1771.

INDUSTRIAL CONCERN. One of the largest industrial concerns in the country desires man with absolute knowledge of English, who has had electrical training, or engineering experience. State education, experience, and salary expected. Location, New York State. R-1772.

SALESMAN with experience to qualify as salesman for company selling asbestos packing and brake lining; territory will be New England and part of New York State. R-1803.

MECHANICAL ENGINEER, preferably familiar with sugar, mining and other industrial machinery; though work would be mainly on sugar machinery, successful applicant would have to handle other mechanical-engineering problems; also must be all-round business man as well as engineer. Location, Peru, So. America. Salary $250 (about) per month. R-1804.

MECHANICAL DRAFTSMAN. Young man 22 to 25 years, with some experience at drafting along mechanical-engineering lines. Duties will be to do detailing and assist on tests in steam-power plant. Location, New Jersey. Salary $25 to $35 per week to start. R-1809.

SALES CORRESPONDENT AND ESTIMATOR. Young mechanical engineer to act as correspondent, estimator and general office assistant; must be capable of writing effective sales letters in response to both foreign and domestic inquiries, must be able to prepare estimates and submit quotations on machinery and must also be able to meet and interview customers who call at office. Application by letter, stating age, education and experience. Location, New York City. R-1810.

MECHANICAL DRAFTSMEN. Experienced in machine design and familiar with up-to-date practice in laying out and construction of semi-automatic machines. Knowledge of general plant work as pertaining to manufacturing industry useful. Openings for two men. Location, vicinity of New York City. Salary $35 to $40 per week. R-1813.

SALES ENGINEER for Pacific Coast. Must be well informed as to power-plant apparatus, well acquainted with Pacific Coast territory and capable of handling entire sales business on Pacific Coast. Advertiser is manufacturer of well-known line of power-plant apparatus. Excellent opening for the right man. State age, education, experience and salary expected. All communications confidential. R-1820.

SALESMAN, power specialties lines; technical education on steam and hydraulics; must have sales experience and be thoroughly familiar with power-plant appliances, including condensers; state age and experience, together with salary expected. R-1821.

PLANT ENGINEER with experience in water gas manufacture. (Coal-gas experience useless.) Would be placed in charge of small plant in vicinity of New York City. (Capacity 1,000,000 cu. ft. per day.) R-1826.

DIRECTOR OF ENGINEERING, 35 to 45, of tactful and diplomatic personality, capable executive, qualified to direct development and experimental work and possessed of thoroughly practical knowledge of manufacturing side of business; must have had at least ten years' experience in internal-combustion engine work, preferably with engines of heavy-duty type. Duties would be to lay out and follow up all engineering work, and take complete charge of engineering department. Location, Indiana. R-1829.

GRADUATE MECHANICAL ENGINEER as assistant mechanical superintendent of large bleaching, dyeing and finishing plant. Textile experience not necessary but will be given preference. R-1830.

INSTRUCTOR IN MECHANICAL ENGINEERING. Preferably a mechanical engineering graduate with some outside experience if possible; must be capable of teaching mechanical drawing and mechanical laboratory work. Location, New York City. R-1833.

EFFICIENCY ENGINEER, familiar with Dr. Parkhurst's methods of production. Duties will be to systematize office. Location, New Jersey. Salary $50 to $75 per week, depending on man. R-1834.

FACTORY MANAGER. Sheet metal experience essential, preferably with furniture. Location, London, England. R-1835.

TOOL AND MACHINE DESIGNER. Large manufacturing concern has opening for several first-class tool and machine designers. Must have experience on punch and die work, and special machinery. In reply state age, salary desired, previous business experience, etc. Location Cleveland, Ohio. R-1840.

FACTORY MANAGER. Old-established concern requires factory manager thoroughly familiar with tool and machine work. Factory at present doing jobbing and contract work. Capacity of factory 200 to 300 men. Man who can obtain 100% efficiency desired. State salary required. R-1841.

ASSISTANT SALES MANAGER, with sales experience, preferably along lines of feed-water heaters, oil and steam separators, coils and bends. Location, New England. R-1842.

MECHANICAL DRAFTSMAN, preferably with knowledge of power plant engineering and, if possible, of design of shop tools. Location, New England. R-1843.

GAS AND OIL-ENGINE DESIGNER. Must be experienced in designing of internal-combustion engines; position in experimental engineering department with company producing gas engines on large production scale. R-1846.

MECHANICAL ENGINEER for testing and research in Government Experiment Station. Applicant must hold degree in mechanical or marine engineering, and must have had four to six years' subsequent experience, part of which has been in test or research work. Applicant must also be able to submit evidence of his ability to prepare reports of tests. Location, Maryland. Salary $3375. R-1847.

SALES ENGINEERS with high-grade sales ability and knowledge of construction machinery, especially conveying machinery. Men who have actually handled the sales of chain shell buckets preferred, but men with experience in allied machinery and equipment will be considered. Good openings for two or three men to qualify for responsible positions. R-1807.

MACHINE DESIGNER, graduate, with several years' experience, two of which should preferably be in the design of automatic machinery. R-1832.

ASSISTANT INDUSTRIAL ENGINEER, recent graduate preferably out of college two or three years, with some experience in industrial engineering and production, with concern manufacturing "hard rubber" goods, as for electrical appliances, etc. R-1831.

CHEMIST with considerable experience along analytical lines. Openings for several men with large well-known manufacturing company, excellent opportunities. Location, New York State. R-1859.

ELECTRICAL ENGINEER, native Norwegian, technical graduate, to translate Norwegian articles, specifications and correspondence into English as well as compile from Norwegian advertisements and catalogs a directory of Norwegian manufacturers for large well-known manufacturing company. Location, New York State. R-1770.

TRANSLATOR for well-known electrical firm expanding its export service, to rewrite electro-technical English into technical Spanish chiefly for publications to be distributed in South America. Engineer preferred. Advancement, etc., will depend on ability and expansion of trade. State qualifications, experience and salary expected. Location, New York State. R-1371.

ADVERTISING ASSISTANT. Young engineer 24 to 28 years of age with sufficient advertising experience and knowledge of printing and engraving to assist in preparation of technical advertising copy, letters, and circulars. To be assistant to sales manager of manufacturer of power-plant equipment. Location, Philadelphia. R-1860

SALES ELECTRICAL ENGINEER, with experience in selling electrical apparatus to industrial plants together with electrical and engineering equipment including engines, pumps, air compressors, condensers, etc. Location, Maryland. R-1861.

MECHANICAL DRAFTSMEN AND DESIGNERS, familiar with elevating and conveying machinery and general cement-plant work or with industrial layout similar to cement-plant work. In replying state age, nationality, education, previous experience and minimum salary acceptable with chance for advancement. Location, Pennsylvania. R-1866.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 12th of the month, and the form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

EXECUTIVE of 20 years' experience in manufacturing small and medium-sized interchangeable work seeks new connection. Especially qualified in reorganizing plants to modern production methods. Can design building, equipment, and install systems necessary for successful manufacturing. A-331.

ENGINEER OR ASSISTANT MANAGER; age 44; married; technical graduate; six months in charge of reinforced concrete work; six years assistant engineer in charge of office on tunnel work and inspection of tunnel construction; eight years engineer and chief draftsman on production work in manufacturing; now in mechanical development work in glass industry. A-2078.

ASSISTANT MANAGER OR SUPERINTENDENT; technical graduate; has devised and installed successful production and cost systems; desires permanent position where there is a bright future. At present employed as head of production department of large corporation. American; age 28; present salary $3500. A-3976.

FUEL AND COMBUSTION ENGINEER; mechanical graduate, with ten years' experience in fuel engineering, as testing engineer for large coal company, wishes position with engineering firm, or industrial concern where economy in use of fuel is important factor. Could handle fuel purchasing to great advantage. A-4234.

GRADUATE MECHANICAL ENGINEER, age 36, married, ten years' experience in heating, ventilating and air conditioning for factories, office buildings, schools, munition plants, etc. At present employed but desires responsible position in charge of work in above line. Salary $4500. A-4299.

MECHANICAL ENGINEER, with eight years' experience in sheet-metal and machine-tool lines; at present chief engineer of plant producing sheet-metal products, in charge of production and time-study work, and of estimating. Is qualified to install and assume charge of production, routing and control systems, or of experimental and research work. Ohio or New England preferred. Broader future desired than present position offers. A-4812.

GRADUATE MECHANICAL ENGINEER, age 25. Several years' experience in development of internal-combustion engines, especially aeronautical types. Was Officer in charge Naval Aviation Engine Lab. Now holding responsible Gov't position in same line. Experience covers shop practice, design, testing and executive work. Desires position with private concern offering good opportunities for advancement. A-5117.

MECHANICAL ENGINEER; age 45, technical graduate with broad experience in mechanical, civil and electrical engineering; covering design, construction, operation, purchasing, management, etc., supplemented by good business experience and possessing initiative, executive and administrative ability. Wishes position of responsibility. Of late years in responsible charge of construction work. Salary $5000–6000. Southern location preferred. A-4976.

MECHANICAL ENGINEER, Cornell, 1913, desires engineering, or executive sales-engineering position. Four years' electro-chemical manufacturing experience, as mechanical superintendent and assistant to acting general manager. Two years' general smelter, concentrator and power-plant designer. Available November 1st. A-3677.

TECHNICAL LEGAL EXECUTIVE; graduate mechanical engineer, bachelor of law and member of New York Bar. Special experience in engineering contracts. Most rigid and unusual technical and legal training. Wants connection with company where this combination training will be of special service. Have highest testimonies of organizing and scientific capacities. Location preferred, New York. Minimum salary $4000. A-4977.

MECHANICAL - ELECTRICAL ENGINEER; desires position in development, sales or executive end of mechanical or electrical business. Understands theory, installation and operation of small mechanical and electrical apparatus. Has worked in capacity of electrician, electrical and mechanical draftsman, chief draftsman, assistant mechanical engineer, plant engineer and is now in charge of a department of instruction. Obtained engineering education by night and correspondence schools, supplemented by private instruction. Age 28, married, location, anywhere in U. S. A-4978.

WORKS MANAGER OR EXECUTIVE ENGINEER; American, age 38, 20 years' active experience. Practical machinist; varied experience in modern lines of production and management. Unusually qualified in highest-grade heavy-machine equipment, small interchangeable parts, machine, carpenter, pattern and forge shops, tool rooms and power plants. Live, progressive, practical leader of men, obtaining the best from them with least amount of friction. Location, Middle West. A-4979.

MECHANICAL AND ELECTRICAL ENGINEER; army officer during the war; graduate mechanical and electrical engineer, with two years' civil engineering training. Engineering experience covering 14 years, includes layout and construction of important sections of industrial plants, armor-plate plant, rifle plant, large-caliber shell-loading plant, a ship yard and considerable river and harbor improvement work. Thoroughly familiar with installation of hydraulic, steam, air and electrical machinery. Desires executive position, requiring practical as well as professional knowledge of engineering, no objection to foreign service if salary is commensurate with position and location. Minimum in the United States $4000. Willing to enter into partnership with another engineer on equal basis. At present employed, but can arrange to make transfer on short notice. A-4226.

INDUSTRIAL ENGINEER wants position as executive. Graduate mechanical engineer with four years' experience as assistant superintendent and as head of production department of large corporation; devised and installed successful cost and production systems in machine shop, blacksmith and boiler shops. A-3976.

MECHANICAL ENGINEER, university graduate. One year in foreign service, recently demobilized. Age 34, married; ten years' experience progressively as draftsman, superintendent and engineer on plant-construction layout. Efficiency methods, special machine design and all piping fire-protection equipment, etc., in connection with extensive up-to-date lumber-manufacturing and wood-working concern. Desires position with progressive growing concern where there is large opportunity for conscientious, loyal work. Location preferred, East or Middle West. A-4866.

MANAGER AND MECHANICAL ENGINEER has sold very satisfactorily his machine-manufacturing business built up during past ten years. Now wishes employment in developing and extending machine-manufacturing business, improving, simplifying, standardizing and adding lines of product, organizing, increasing and cheapening production. Prefers permanent position and substantial interest in results. Long and successful experience in above lines and in cooperating with parent companies to develop subsidiary manufacturing plants. Technical graduate, 50 years of age. A-4952.

EXECUTIVE with 20 years' exceptional experience and proved capacity now completing well-known successful enterprise of considerable magnitude desires connection as manager of manufacturing and industrial concern where health, energy, capacity, personality and experience can be utilized. A-2095.

MECHANICAL ENGINEER, graduate, several years' experience in general design, appraisal, construction, operation of power, industrial and manufacturing plants, desires permanent connection, New York City or vicinity. Now in the employ of the U. S. War Department as Appraisal Expert, where work is about completed. A-4850.

ASSISTANT TO PRODUCTION ENGINEER OR SUPERINTENDENT; technical graduate. Age 27, ex-captain of Engineers. Familiar with modern production methods. Has had experience along textile lines. Location immaterial. A-1397.

EXECUTIVE OR RESPONSIBLE ASSISTANT; New York City connection of more importance than salary first paid, experienced combined technical and executive duties, in charge purchases, plant and office supervision, valuation, industrial and financial statistics. A-116.

MECHANICAL ENGINEER; age 24; technical graduate; seven and one-half years' experience on power houses, industrial plants, factory buildings, equipment for same and machine and structural design. Desire to make connections with large corporation for work abroad or South America principally, but will accept position in U. S. Position must require initiative and attached responsibility. A-640.

POWER-PLANT EXECUTIVE; Cornell M.E. graduate, with 20 years' experience in design, construction and operation of steam and hydro-electric plants; has good record for handling men and material. Best of references from owners of power plants of his design and construction. A-3480.

PLANT ENGINEER, technical graduate, just completing five years of service and the supervision of a three-million dollar program of addition to plant and equipment for one

of the largest concerns in the country. Mechanical electrical and civil engineering. At present directing a plant organization consisting of 12 field engineers, 1000 mechanics, and a number of contractors engaged on contract work. Salary $6000 per year. Available about October 27th. A-4980.

MECHANICAL ENGINEER experienced in design and construction of steel street cars and auto-truck bodies would like position as general manager of small business, factory manager of large company or manufacturing representative where experience could be used to advantage. A-4991.

MECHANICAL ENGINEER, 35 years of age, technically educated, 15 years' experience in design, manufacture, and power-house operation wishes to engage with company financially or directly in control of large power-house interests. Responsibility of steam costs desired. Present position chief engineer for large corporation in charge of efficiency and experimental department in connection with power-house apparatus and operation. Position desired will be worth $10,000 per year. A-4990.

SALES MANAGER with over 20 years' responsible sales and executive work on highest-grade machine tools desires connection with firm selling its production present workmanship, values and business methods. University education. Eastern location preferred. Available on reasonable notice. A-4803.

ENGINEERING EXECUTIVE, 20 years' experience in mechanical, hydraulic and civil engineering, along lines of production, construction and operation. Last ten years executive with responsibility of large and complex operations. Desires connection with progressive organization when full opportunity will be given to demonstrate ability. Can bring principal assistant and private secretary into organization if required. A-4986.

WOODWORKING EXPERT—PRODUCTION ENGINEER; technical graduate mechanical engineering, American, 25 years of age. Education and training in production engineering. Familiar with wood and metal-working tools, also methods of routing, scheduling, and control charting. Past two years in responsible charge of war work relative to the manufacture of aircraft propellers. First-hand knowledge of manufacturing and production problems of laminated wood products. Desires responsible connection with live manufacturing concern with woodworking problems. A-868.

SALES ENGINEER; technical graduate, aged 25, desires position with good concern in sales engineering. Power-plant work preferred, location, eastern territory. A-2819.

MECHANICAL ENGINEER, Columbia graduate, 1912, for past seven years in power and refrigeration work; recently returned from France, desires change of position as assistant superintendent or assistant manager, or in similar capacity. A-4993.

EXECUTIVE ENGINEER desires change in position, has strong personality and can produce results without friction by the use of tact and common-sense methods. Married. Technical education. Seventeen years' experience in industrial-plant engineering. Nine years in charge as works engineer or manager in the U. S. and Canada. Steam-power plants, paper and pulp mills, cement plants and ship yards. Design, erection reports development, management, maintenance, operation, equipment, production, contracts. Working knowledge of French. Connection desired with reputable concern desiring results with commensurate salary for responsibility. A-3060.

MECHANICAL ENGINEER OR SUPERINTENDENT, technical graduate with 15 years' practical experience in estimating and designing special apparatus of sheet and plate steel, tank work, low-pressure and high-pressure boilers, coal pulverizers and chemical apparatus. Good executive, successful experience in handling help and producing results. At present in charge of engineering department of old-established concern where field is not broad enough for experience and ability. Salary $4000. A-4231.

EXECUTIVE ENGINEER, age 33; 11 years' manufacturing and business experience in iron and steel products and sales, desires connection in New York district. Possesses character and personality required to meet men of high standing. Qualified to handle financial and administrative work. Under suitable conditions would be willing to acquire an interest in a going engineering or manufacturing organization capable of growth and development. A-4735.

YOUNG MAN, married, age 26 years, desires position with well-established concern. Experience consists of four years in machine shop and drafting room of plant manufacturing saw-mill machinery, one year draftsman, two years engineer and designer, and two years superintendent of plant manufacturing small automatic machinery. Available Nov. 1st. A-4995.

POWER-PLANT ENGINEER. Present plant maintains monthly boiler-room efficiency of 83 per cent. on variable load. Experienced in obtaining maximum turbine efficiency, and low plant-operating costs. Now employed. Technical graduate. Age 29. Minimum salary $3600. A-4994.

FOREIGN REPRESENTATIVE, experienced sales engineer, American; 40 years; married; desires to represent one or more firms in the three Scandinavian countries and Finland. Possesses language qualifications and has had extensive experience in auto-sprinkler business in charge of engineering and construction as well as of sales; would consider connection in this line of work. A-4251.

INDUSTRIAL ENGINEER, graduate of Cornell University in mechanical engineering. Instructed at Cornell in industrial engineering. First Lieutenant Ordnance Department, held responsible executive position during period of war at big government plant employing 15,000 men. Assisted in reorganizing and resystematizing that plant, also had charge of developing and installing certain phases of system. Desires executive or assistant executive position in large plant, or in medium-sized plant requiring reorganization and building up. Has excellent knowledge of modern methods of production and has ability to install same with success. Age 26 and married. Minimum salary $3600. A-4992.

MECHANICAL AND ELECTRICAL ENGINEER of highest qualifications who has just terminated important five years' government appointment is open for engagement in responsible work, specializing I. C. engines and the use of liquid fuels. Has had very extensive experience with engines of all kinds; very successful in handling labor on accurate quantity production. A-4374.

SALES ENGINEER AND SALES EXECUTIVE, graduate mechanical engineer; 13 years' active experience, manufacturing, plant maintenance, industrial engineering and selling to metal-manufacturing industries. Can estimate and analyze cost of production, properly advertise, write up catalogs and descriptive data. Close up contracts, organize and follow up selling campaigns. Has initiative and ability to get results. Age 35. Location immaterial. A-2135.

PLANT ENGINEER; technical graduate, American, age 36; married; desires position with a company having a number of manufacturing plants as engineer in charge of plant maintenance and the construction of new plants. A-2180.

MASTER MECHANIC; age 42; executive ability; tactful; 20 years' experience. Technician; expert hydraulic, steam and electrical engineer; best of references. Eastern position desired. A-4981.

DESIGNER AND ENGINEERING EXECUTIVE; 15 years' experience, desires to locate in New York metropolitan district, or in New England. Is university graduate, thoroughly acquainted with shop practice and modern production methods, cost and estimating. A-4982.

EXECUTIVE position desired by man 33 years of age. Eight years' shop experience. Mechanical engineering graduate from I. C. S. Three years as draftsman and designer. Three years mechanical superintendent, having charge of 100 men in textile mill. One year assistant chief engineer on automatic machines. At present employed. Minimum salary $60 per week. A-4961.

MECHANICAL ENGINEER. University graduate, 29 years of age, with wide experience in mechanical department on western railroads. Three years in present position as shop engineer for one of the largest railway shops in the west; 18 months as engineer officer in A. E. F. Desires position as assistant to superintendent, shop engineer, or chief draftsman with responsible firm where there is a future reward for making good. A-4685.

GRADUATE METALLURGICAL ENGINEER experienced in modern machine-shop and foundry-plant control and construction desires position as engineer of tests, or in some other engineering capacity. Age 28. Married. Salary $2800. A-4983.

HEATING AND VENTILATING ENGINEER; M.E., 1916, Columbia. Two years estimating and designing heating, ventilating and power-plant machinery. Desires position with large concern, who will send him out into the field for actual supervision. Available on short notice. A-4984.

MECHANICAL AND METALLURGICAL ENGINEER; 25 years' experience in America and Europe, naturalized citizen, desires to return or take agency; talks French, German and some Bohemian. Best of health and references. Steel-works expert in gas producers, open-hearth electric crucible and tool steel furnaces, rolling mills, steel-wheels and forging-shops springworks; guarantees profitable savings and increased output. Was also consulting engineer and has thorough understanding of machinery and engines. A-4985.

PRODUCTION SUPERINTENDENT OR MANAGER; broad experience as production superintendent in plants requiring accuracy and intensive product. Also had supervision of special tooling operations, routing, scheduling and modern methods. Successful experience in handling help; can furnish best of references. Location immaterial. At present employed. Available on short notice. A-2975.

MECHANICAL ENGINEER, M. I. T. graduate. Age 27. Two years' experience on application and development work testing of small motors and works-management investigation. Two years' experience as mechanical engineer in general mill engineering for manufacturing plant. At present employed. Desires to get into production and management work or position along executive lines with industrial concern. A-4987.

WORKS MANAGER, age 43, now employed, desires connection with responsible corporation as works manager or general superintendent. Experienced in manufacturing medium and light-weight, high-grade machinery in quantity. Had thorough shop and drafting practice and understand planning, scheduling, routing, purchasing, shipping, etc. Several years' experience in handling men. A-4988.

ENGINEERING EXECUTIVE OR SALES ENGINEER. Just concluded work with material-handling industry, desires connection in New York City with architectural, building or engineering firm. Served as Captain in U. S. Army, Air Service. Has had extensive experience covering mechanical and electrical equipment in modern commercial buildings, etc., and is thoroughly grounded in material-handling methods, water-supply systems, sanitation and contract, purchasing and specification work. Salary $5000 to $6000 per year or drawing account and commission. A-4845.

SALES AGENT AND ENGINEER; mechanical engineer; age 39, married; British, with intimate knowledge of Spanish, wishes correspondence with American house where thorough understanding of characteristics and customs of Spanish-speaking peoples would be desirable. Twelve years' experience as works engineer in Spain, Argentine and Mexico with mining, smelting, oil-refining and superphosphate industries, and previously six years as marine engineer. A-4989.

MECHANICAL ENGINEER; graduate; married; practical experience in shops on power-plant work, drafting room on conveying systems and as master mechanic of manufacturing concern; desires to connect with live manufacturing concern where interest will help create opportunity. Present salary $3300. Philadelphia preferred. A-3275.

ENGINEERING EXECUTIVE, American, age 32, married, ex-army officer; desires responsible connection with progressive concern. Experienced in interchangeable-parts manufacture, and raid production wire and sheet metal, wood, paper, rubber and other goods through the use of special and standard automatic machines; has personally designed, built and operated many types of automatic machines, tools, jigs, fixtures and gages. Has served as draftsman, foreman, superintendent, efficiency and consulting engineer. Employed at present but desires larger field and responsibilities, preferably as works manager or superintendent. Location preferred, Philadelphia. A-3584.

MANUFACTURING EXECUTIVE, technical graduate, 17 years' experience in design and construction of machine tools, electric equipment and manufacture of small high-grade machine specialties in large quantities and on interchangeable basis. Thoroughly experienced in economic production, administration, sales and finance. A-4996.

CREATIVE MACHINE DESIGNER, technical graduate, with experience on rubber, excavating and automatic match machinery, also general machine-design experience, desires position with manufacturing firm or consulting engineer. Especially qualified to develop improved machines and manufacturing methods. A-5001.

MECHANICAL ELECTRICAL ENGINEER 15 years' experience in efficient power production, both steam and hydro, and transmission with public utilities. Several years on installation of electrical equipment in large industrial plants. At present executive engineer of industrial plant in charge of power generation and distribution, maintenance and repair of all mechanical and electrical equipment and repair shop. Excellent references as to character, organizing and business ability. Age 35, married. Middle West location preferred. A-3233.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER NOV. 18

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 135.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by Nov. 18, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

Arizona

MARRIOTT, RICHARD A., Draftsman, Phelps-Dodge Corp., Copper Queen Branch, Douglas
NEWCOMB, RUSSELL E., Machinist Helper, International Smelting Co., Miami

Colorado

LEVINE, HYMAN, Student, University of Colorado, Boulder
LYSTER, ARTHUR F., Engineer, Great Western Sugar Co., Denver

Connecticut

AMADON, CHARLES S., Resident Engineer, J. N. Laponite Co., New London
CARRUTH, EDWIN W., Production Manager, Aeolian Co., Meriden
FALLON, JOHN H., Mechanical Draftsman, M. B. Schenck Co., Meriden
HOELZEL, OTTO, Planning Engineer, Geometric Tool Co., New Haven
KALM, HERBERT C., Calculator, Lake Torpedo Boat Co., Bridgeport
STANTON, RICHARD F., Tool Designer, Pratt & Whitney Co., Hartford
WHITE, ARTHUR A., Cutlery Engineer, Winchester Repeating Arms Co., New Haven

Delaware

PENFIELD, WALTER G., Vice-President, Artillery Fuse Co., Wilmington

District of Columbia

RUTHERFORD, HARRY K., Colonel, Ordnance Department, Artillery Division, Washington
SYLVANDER, ROY C., Assistant Physicist, Bureau of Standards, Washington

Georgia

DAVIS, EDWIN K., Assistant Purchasing Agent & Mechanical Engineer, Fulton Bag & Cotton Mills, Atlanta
JONES, ADAM W., Manager, Worthington Pump & Machinery Corp., Atlanta

Illinois

JORDAHL, ARNE, Assistant & Draftsman to the Industrial Engineer, Union Special Machine Co., Chicago
MOORE, OSCAR W., Development Engineer, Brass Specialty Department, Western Cartridge Co., E. Alton
ROESCH, FRANK P., Regional Fuel Supervisor, Fuel Conservation Section, U. S. R. R. Administration, Chicago

Indiana

CROSIER, PAUL E., Assistant Superintendent, Citizens Gas Co., Indianapolis
HUDSON, RAY N., Superintendent, Prospect Plant, Citizens Gas Co., Indianapolis

Maryland

DUFFEY, PAUL R., Supervisor of Power Plants, Western Maryland Railroad, Hagerstown
STOCKER, WILLIAM M., Draftsman & Mechanical Engineer, Bethlehem Steel Co., Sparrows Point

Massachusetts

HEATH, CARL J., Tester, General Electric Co., Pittsfield
HOPKINS, FRANK H., Mechanical Engineer, American Steam Gauge & Valve Manufacturing Co., Boston
MOULTON, DAVID, Assistant Mechanical Engineer, Monks & Johnson, Boston
OSGOOD, HAROLD R., Draftsman & Designer, B. F. Sturtevant Co., Readville
WHEATON, FREDERICK W., Assistant General Superintendent Construction, The Lamson Co., Boston
WHEELER, HARRY E., Certified Public Accountant, Counselor-at-Law, Boston
WHOLEAN, GEORGE R., Plant Engineer, Strathmore Paper Co., Mittineague

Michigan

DRAKE, ARCHIBALD L., Manager, Southern Office, Wright Austin Co., Detroit
FROELICH, HOLMES L., Draftsman, Buick Motor Co., Flint
GRASSBY, GEORGE A., JR., Mechanical Engineer, Lockwood, Greene & Co., Detroit
PANFIL, ANTHONY C., Tool Designer, Cadillac Motor Co., Detroit
SOMERS, GRAHAM G., Assistant Work Engineer, Champion Ignition Co., Flint

Minnesota

BAKER, ARTHUR W., Machinist, Hawley Manufacturing Co., Minneapolis

Missouri

THUMSER, ROBERT C., Engineering Department, Brown Shoe Co., Inc., St. Louis

New Jersey

BALLINGER, JOSIAH P., Engineer, The

Singer Manufacturing Co., Elizabethport
BURK, HERBERT G., Assistant Engineer, Public Service Electric Co., Newark
COOPER, WILLIAM K., Rate Setter, Spicer Manufacturing Corp., So. Plainfield
GORLIN, SOL, Jersey City
INWRIGHT, JOHN A., Cadet Engineer, Public Service Electric Co., Newark
JONES, HARALD L., Assistant Superintendent, W. W. Farrier Co., Jersey City
RITCHINGS, HAROLD E., Estimator & Superintendent, F. & W. V. Engelberger Co., Newark
SWANKER, SIDNEY E., Lieutenant, Ordnance Department, U. S. Army, Hoboken
VASSELLI, ANTHONY J., General Superintendent, Otto Heineman Phonograph Supply Co., Newark
WATSON, HUBERT W., Marine Erector, Babcock & Wilcox Co., Bayonne
WILLIS, RICHARD M., Engineer, International Coal Products Corp., Newark

New York

ASHLEY, GEORGE R., Apparatus Analysis Engineer, Western Electric Co., Inc., New York
BINDER, IRVING, Estimator & Engineer, Walker & Chambers, New York
BORNSTEIN, HYMAN, Captain, Ordnance Department, U. S. A., New York
BUZBY, ARTHUR D., Assistant to Designing Engineer, Chile Exploration Co., New York
CLARK, WALLACE, Member of Staff of H. L. Gantt, New York
DEXTER, GREGORY M., Office Engineer, Honolulu Iron Works, New York
ERTEL, FRED J. K., Chief Draftsman, The Griscom Russell Co., New York
FLEET, SAMUEL, Sanitary Engineer, W. G. Cornell Co., New York
HARBISON, WARREN G., Designing Engineer, Wilputte Coke Oven Corp., New York
HINCHMAN, WILLIAM R., Engineer, Thompson-Starrett Co., New York
HOLLWITZ, LUDWIG A., Tool Room Superintendent, John Thomson Press Co., Long Island City
KENLY, ROBERT G., Mechanical Engineer, New Jersey Zinc Co., New York
LOVAS, VINCENT, Supervisor of Tool Designing, Sperry Gyroscope Co., Brooklyn
McKEEN, E. W., N. Y. Manager, Union Twist Drill Co., New York
MARTIN, BROOKS C., Assistant Engineer, Walter Kidde & Co., Inc., New York
MARTIN, WILLIAM C., Chief Engineer, Kyle & Purdy, Inc., City Island
MEINKE, FREDERICK, JR., Central Office Repair Man, N. Y. Telephone Co., Brooklyn
MEISTERKNECHT, HERBERT, In Charge of Erection & Test Turbines, De La Vergne Machine Co., New York
MORRISS, ARTHUR D., Assistant Engineer, Interborough Rapid Transit Co., New York
MOULDER, GEORGE L., Foreman, Sperry Gyroscope Co., Brooklyn
NICHOLS, EDGAR B., Chief Engineer, The Pfaudler Co., Rochester
OLCOTT, MORGAN, Draftsman, Griggs & Myers, New York
PATTERSON, ROSS E., Manager Transmission Department, S. K. F. Industries, Inc., New York
PHILLIPS, PETER J., Manager Foreign Department, Consolidated Steel Corp., New York
PUTNAM, SAMUEL J., Boiler Designer & Engineer, Globe Indemnity Co., New York
RICHARDSON, CHARLES E., Vice-President, International Coal Products Corp., New York
SCHARNAGEL, HERMAN J., Mechanical Engineer, Sperry Gyroscope Co., Brooklyn
STONE, LEONARD, Assistant to Superintendent, Champlain Silk Mills, Brooklyn
TULLOCH, ARCHIE W., Plant Draftsman, Sperry Gyroscope Co., Brooklyn
VAIL, CARL W., Sales Engineer, Henry R. Kent & Co., New York
WIEDMANN, ALFONSO R. J., Brooklyn
WILLE, FRANK J. A., Assistant Production Manager, De La Vergne Machine Co., New York

Ohio

BAKER, CHARLES, Senior Member of Firm, Baker & Schuttler, Toledo
BARBER, LOUIS, Mechanical Engineer, National Screw & Tack Co., Cleveland
BATTERSON, DWIGHT C., Engineer, The Williamson Hydraulic Clutch Co., Mt. Vernon
BRYANT, WALTER B., Mechanical Engineer, Republic Rubber Co., Youngstown
DANIELS, IRVING L., Captain, Engineers, U. S. Army, Madison
HETTINGER, ALOIS E., Assistant Chief Engineer, Humphreys Manufacturing Co., Mansfield
HIBBARD, MERRILL, Manager of Engineering, Jeffrey Manufacturing Co., Columbus
MASTERS, JOHN H., Engineer, The Vaile-Kimes Co., Dayton
PATTISON, FLOYD, Engineer & Electrician, Humphreys Manufacturing Co., Mansfield
SCHIEFER, HERBERT V., Engineer, Grasselli Chemical Co., Cleveland
SNIDER, CHARLES M., Manager, Development Department, Jeffrey Manufacturing Co., Cleveland
STOCKENBERG, RUBEN, Laboratory Assistant, Lynite Laboratories, Aluminum Castings Co., Cleveland
SWIFT, PAUL F., Production Engineer, Akron Gas Lamp Co., Akron
TRAINER, JAMES E., Master Mechanic, Babcock & Wilcox Co., Barberton
WISE, JAMES D., Engineering Department, Cleveland Osborn Manufacturing Co., Cleveland

Pennsylvania

BARNELL, MURRAY W., Sales Department, Westinghouse Electric & Manufacturing Co., East Pittsburgh
BOLLINGER, GEORGE R., District Sales Manager, Electric Auto-Lite Corp., Philadelphia
BUCK, HERMAN J., Chief Engineer and Superintendent, Mathews Gravity Carrier Co., Ellwood City
CHILDS, GEORGE W., Works Engineer, American Steel Foundries, Chester
GOLDMAN, SOLOMAN, Assistant to Engineer of Tests, Atlantic Refining Co., Philadelphia
HALL, IRVING G., Designer, Landis Engineering & Manufacturing Co., Waynesboro
HOFFMAN, LEON F., Chief Engineer, Chicago Pneumatic Tool Co., Franklin
KLINGER, GEORGE W., Engineer of Tests, Vibration Specialty Co., Philadelphia
KNIGHT, SEYMOUR H., Civil Engineer, Day & Zimmerman, Philadelphia
PAULSEN, ALFRED A., Assistant Research Engineer, Philadelphia Textile Machine Co., Philadelphia
PUGH, GEORGE A., In Charge of Estimating Department, Standard Engineering Co., Ellwood City
READ, SYLVESTER C., Motive Power Inspector, Pennsylvania R. R. Co., Pittsburgh
ROACH, JOSEPH H., President, Joseph H. Roach & Co., Inc., Philadelphia
WILSON, REX C., Chief Draftsman, Coatesville Boiler Works, Coatesville
YUEN, KEYIH S., Graduate Student, Westinghouse Electric & Manufacturing Co., East Pittsburgh
ZOLLINGER, WALTER H., Draftsman and Chargeman, Bethlehem Shipbuilding Corp., Bethlehem

Virginia

BUNN, FREDERIC L., Production Engineer, United Cigarette Machine Co., Lynchburg
CREWDSON, HENRY, Construction Engineer, Viscose Co., Roanoke

West Virginia

MEURLING, IVAR, Supervising Engineer, Explosives Plant "C," Nitro

Wisconsin

BECKER, ALFONSE N., Consulting Engineer, Becker-Menzel-Becker, Racine
WHEATON, ROBERT S., Sales Engineer, The Vilter Manufacturing Co., Milwaukee

Canada

MOELLER, ISAK G., Chief Engineer, The Eastern Car Co., Ltd., New Glasgow, Nova Scotia

Spain

MONTANES, CHARLES E., Consulting Engineer, Barcelona Traction Light & Power Co., Barcelona

CHANGE OF GRADING PROMOTION FROM ASSOCIATE-MEMBER

Maryland

VOORHEES, JOHN R., Major, Ordnance Department, Aberdeen Proving Ground, Aberdeen

New York

DE LEMOS, SIDNEY P., Mechanical Engineer, Bureau of Public Buildings and Offices, New York

Pennsylvania

LEWIS, ALEXANDER T., Member of Firm, Lewis Robinson & Gant, Philadelphia
REIBER, HARRY P., Chief Mechanical Engineer, Oil Well Supply Co., Pittsburgh

Alaska

PULLEN, ROYAL R., Mechanical Engineer, Shagway

PROMOTION FROM JUNIOR

Connecticut

TABOR, WILLIAM H., Industrial Engineer, Winchester Repeating Arms Co., New Haven

Illinois

HEALD, GEORGE W., Mechanical Designing Engineer, Bureau of Engineering (Reinstatement), Chicago
JELLUM, KRISTEN, Special Machine Designer, Western Electric Co., Hawthorne

Massachusetts

KENT, ROBERT W., Construction Engineer, Cooley & Marvin Co., Boston

New Jersey

SWALLOW, HOWARD J., Industrial Engineer, The Celluloid Co. (Reinstatement), Newark

New York

CHANDLER, HEMAN W., Draftsman, Maintenance Department, American Locomotive Co., Dunkirk
MORRISEY, RICHARD E., Machine Designer, C. Spiro Manufacturing Co., New York

Ohio

FEHR, ROY B., Assistant Physicist, Recording and Computing Machine Co., Dayton

Pennsylvania

GEST, ALEXANDER P., JR., Assistant Superintendent, The Barrett Co., Frankford

Virginia

ALLISON, JOHN F., Works Manager, Secretary and Treasurer, Spotswood-Allison Manufacturing Co., Petersburg

Cuba

GIANELLONI, VIVIAN J., General Superintendent, The Central Teresa Sugar Co., Oriente

Canada

SPIDY, EDGAR T., Production Engineer, Canadian Pacific Railway, Angus Shops, Montreal

SUMMARY

New Applications	118
Applications for change of grading	
Promotion from Associate-Member	5
Promotion from Junior	12
Total	135

SUMMARY SHOWING AVERAGE AGE AND POSITIONS OF APPLICANTS ON BALLOT CLOSING SEPTEMBER 30, 1919

Average age of applicants

Members	40
Associates	38
Associate-Members	33
Juniors	25

Appraisal Expert	1
Chief Engineers	18
Construction Engineers	3
Consulting Engineers	6
Designers	14
Draftsmen	12
Chief Draftsmen	10
Editor	1
Associate Editor	1
Estimators	2
Electrical Engineer	1
Executives (Pres., Vice-Pres., Secy., Treas., Mgrs.)	44
Foreman	6
Asst. Foremen	3
Industrial Engineers	3
Inspectors	7
Asst. Inspectors	3
Instructors	3
Lubrication Engineer	1
Maintenance Engineer	1
Mechanical Engineers	48
Asst. Mechanical Engineers	11
Metallurgical Engineer	1
Physicists	2
Plant Engineers	4
Production Engineers	3
Professors	3
Asst. Professor	1
Assoc. Professor	1
Purchasing Engineer	1
Purchasing Agent	3
Sales Engineers	8
Sales Manager	1
Student	1
Superintendents	20
Asst. Superintendents	4
Miscellaneous	71

UNITED STATES GOVERNMENT SERVICE

Major	1
Captain	4
1st Lieut	7
2nd Lieut	1
Ensign	3

PROPOSED AMENDMENTS TO THE CONSTITUTION

Proposed amendments to the Constitution have been mailed to each member entitled to vote, in accordance with C57 of the Constitution. These amendments are to be presented for discussion and final amendment at the Fortieth Annual Meeting in New York, December 1919, and if ordered by that meeting are to be balloted on March 1, 1920 and the result announced at the 1920 Semi-Annual Meeting to be held in St. Louis, Mo., about May 1920.

The amendments were submitted in writing at the Semi-Annual Meeting of the Society at Detroit, Mich., June 1919, following the discussion of the first reading of the recommendations of the Committee on Aims and Organization, and all of them have a bearing on this report. The latter is to be presented in final form at the Annual Meeting this year. Members are referred to page 604 of MECHANICAL ENGINEERING (July 1919) for the discussion of the recommendation of the Committee.

A new printing of the Charter, Constitution and By-Laws has just been made and copies may be obtained upon request.

ORIGINAL ARTICLES	PROPOSED AMENDMENTS	COMMENT
C45 The Standing Committees of Administration of the Society shall be	C45 The Standing Committees of Administration of the Society shall be	
Committee on Finance Committee on Meetings and Program Committee on Publication and Papers Committee on Membership Committee on Local Section Committee on Constitution and By-Laws	Committee on Finance Committee on Meetings and Program Committee on Publication and Papers Committee on Membership Committee on Local Sections Committee on Professional Sections Committee on Constitution and By-Laws	COMMITTEE ON PROFESSIONAL SECTIONS added
The appointment, organization, duties and terms of service of these Standing Committees shall be as the By-Laws provide. The Chairman of each Standing Committee of Administration shall have a seat in the Council of the Society but no vote. There shall be other standing committees of the Society as the By-Laws provide and the Council approves.	There shall be other Standing Committees of the Society as the By-Laws provide and the Council approves. The appointment, organization, duties and terms of service of all Standing Committees shall be as the By-Laws provide. The Chairman of all Standing Committees shall have a seat in the Council of the Society, but no vote. The Secretary of the Society shall be the Secretary of each of the Standing Committees.	Clauses transposed. Last clause of amended article changed to provide for ALL standing committees being represented on Council.
C49 Professional Committees. The Council shall have power to appoint, upon a recommendation of the Society at a general meeting, or upon its own initiative, such Professional Committees as it may deem desirable, to investigate, consider, and report upon subjects of engineering interest. Reports of such committees may be accepted by the Society and printed in the Transactions, but shall not be approved or adopted as the action of the Society. Any proposed expenses of such committees must be authorized by the Council before they are incurred.	C49 Professional Committees. The Council shall have power to appoint, upon a recommendation of the Society at a general meeting, or upon its own initiative, such Professional Committees as it may deem desirable, to investigate, consider, and report upon subjects of engineering interest. Any proposed expenses of such committees must be authorized by the Council before they are incurred.	Last clause transposed from old C50, see below.
C56 The Society shall not approve or adopt any standard or formula, or approve any engineering or commercial enterprise. It shall not allow its imprint or name to be used in any commercial work or business.	C50 The Society may approve or adopt any report, standard formula or recommended practice and may print the same in the Transactions. It shall, however, not approve any engineering or commercial enterprise. It shall not consent to the use of its name or initials in any commercial work or business, except to indicate conformity with its standards or recommended practices.	Second clause deleted. New C50 to provide for such printing, approval and adoption.
	C56 (TO BE ELIMINATED. SUPERSEDED BY C50 ABOVE.)	Reverses previous policy on approval or adoption of reports. Second clause transposed from old C56 without change of meaning. To be new Article C50, changing numbering of old C50 to C51, old C51 to C52, old C52 to C53, old C53 to C54, old C54 to C55, old C55 to C56, old C56 eliminated, thence forward numbering as before.
C50 Each committee shall perform the duties required of it in the By-Laws, or assigned to it by the Council. The Secretary of the Society shall be the Secretary of each of the Standing Committees.	C51 Each committee shall perform the duties required of it in the By-Laws, or assigned to it by the Council. Membership on the Council or any committee of the Society shall terminate automatically on account of absence of any member, either wilful or due to force of circumstances, as provided in the By-Laws.	Clause inserted to provide for absenteeism from committee work. Last clause transposed to be last clause of C45.

In Two Sections—Section Two

Volume 41 Number 12

MECHANICAL ENGINEERING

THE JOURNAL OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

A. S. M. E. Affairs

DECEMBER-1919

PUBLISHED MONTHLY BY THE SOCIETY
29 WEST 39TH STREET, NEW YORK, U.S.A.

Coming Section Meetings

New Orleans Section.

December 8: At Louisiana Engineering Society. Subject to be announced.

Philadelphia Section.

December 15: Joint meeting with American Society of Heating and Ventilating Engineers, at Philadelphia Engineers' Club. Oil as a Fuel, by Henry Thomas, of the Sun Company, and E. H. Peabody, Vice-President of Babcock & Wilcox Co., Philadelphia.

St. Louis Section.

December 19: At the St. Louis Engineers' Club. Subject to be announced.

Atlanta Section.

December 23: Place and subject to be announced.

Cleveland Section.

December 23: Rooms of the Cleveland Engineering Society, Hotel Statler. Subject to be announced.

Boston Section.

December (exact date to be announced): Inspection of the Watertown Arsenal; dinner; paper on the Heat Treatment of Metals.

Indianapolis Section.

Every Thursday: Luncheon meeting at the Scientech Club.

San Francisco Section.

Every Thursday: Luncheon meeting at the San Francisco Engineers' Club.

New York Section.

The Section wishes to call to the attention of members outside of New York its welcome to them at all meetings, and its willingness to place their names on the New York mailing list, upon request.

The Secretary's Trip South

The members of the American engineering societies in Cuba have formed a society of their own, and invited the secretaries of the Four Founder Societies to address a general meeting of the engineers of Cuba on the evening of December 9. Secretary Rice represented our Society and will include in his itinerary visits to a number of Southern cities where the rapidly growing industries give promise of the early establishment of Local Sections. The itinerary follows:

December 9: Havana, Cuba
December 14: Savannah, Ga.
December 15: Charleston, W. Va.
December 17: Chattanooga, Tenn.
December 18: Nashville, Tenn.
December 19: Louisville, Ky.
December 20: Youngstown, Ohio
December 22: Harrisburg, Pa.
December 23: Scranton, Pa.

SOCIETY AFFAIRS

Affairs of Interest to the Membership — Secretary's Letter — Council Notes — Section Meetings — Personals — Employment Bulletin — Candidates for Membership

Secretary's Letter

The best piece of news of the month is the announcement by the American Institute of Mining and Metallurgical Engineers that Mr. Hoover has accepted the nomination for the Presidency of the Institute next year.

Your Secretary was privileged to be at the little dinner at which Mr. Hoover was present when this announcement was made. Mr. Hoover in responding, stated his whole-hearted belief in the capacity of the engineers to help solve the present industrial difficulties if only their method in ascertaining facts was employed. He said in substance that if we had all of the facts it would not take a great intellect to apply the remedy.

The assumption of office in any of the National Engineering Societies by devoted and capable men like Mr. Hoover brings great credit to the other engineering societies and to the profession, and we all shall benefit by his splendid example and leadership.

Dr. W. M. Best, Mem.Am.Soc.M.E., has just sent out a card quoting from Dr. Oliver Wendell Holmes and then adding his own comments. Among the quotations from Dr. Holmes is:

> Success is the result of a mental attitude, and the right mental attitude will bring success in everything you undertake. Men who succeed have faith in themselves and faith in their fellows.

Then Dr. Best adds among other quotations:

> A gentlemen is one who keeps his promises, made to those who cannot enforce them. This day I will live as becomes a man; I will be filled with good cheer and courage. Be a friend to all—stand by all—speak well of all. Before you can manage men, you must learn to manage yourself.

The other day I was reading somewhere that "the City of Happiness is located in the State of Mind."

The relation of all this to us as engineers is that we should bring about a normal condition in society today through our wonderful capacity for analysis of the causes for unrest and put our own selves right, and then proceed to help every one else to put his attitude right toward each other and the world.

If, therefore, every member of each of the engineering societies should undertake to put himself right, think of the power that we could exert in helping solve the various situations that need to be solved at the present time!

As it always helps to have leaders express definite opinions, the Society at its Annual Meeting this month had two or three of the leaders of thought in America give addresses on the industrial situation. There was one of the most complete technical programs in addition, a comprehensive account of which will appear in the January issue of MECHANICAL ENGINEERING.

CALVIN W. RICE,
Secretary.

Council Notes

A meeting of the Council was held at the Claypool Hotel, Indianapolis, Ind., October 24 and 25, in connection with a meeting of the Mid-West Sections of the Society under the auspices of the Indianapolis Section. There were present: *President* M. E. Cooley, presiding; *Vice-Presidents* Max Toltz, Fred R. Low; *Managers* William B. Gregory, D. Robert Yarnall, Charles Russ Richards, Robert H. Fernald, Frank O. Wells; *Past-President* Ira N. Hollis; *Chairmen of Standing Committees of Administration,* Wilson E. Symons, *Finance;* D. S. Kimball, *Meetings and Program;* Geo. A. Orrok, *Publication and Papers;* Arthur M. Greene, Jr., *Chairman Research Committee.* L. E. Strothman, one of the Society's representatives on the National Industrial Conference Board, L. C. Nordmeyer, Chairman of the St. Louis Local Section, C. H. Benjamin, Arthur L. Rice, Chairman of the Chicago Local Section, and S. N. Castle were present by invitation, and Calvin W. Rice, *Secretary.*

Executive Committee Meetings. Minutes of all Executive Committee meetings held during the summer were approved.

Aims and Organization Committee. The report of this committee and the report of the Joint Conference Committee of the Founder Societies were received and ordered printed and distributed to the membership in pamphlet form previous to the Annual Meeting. The committee was discharged with an expression of the Council's appreciation of its work. The Society's present four representatives, L. C. Marburg, D. S. Kimball, L. P. Breckenridge and E. S. Carman, on the Joint Conference Committee, were continued until the close of the Annual Meeting.

James Watt Centenary. J. Wilfrid Harris, H. F. L. Orcutt, R. Stanford Riley and W. E. Symons were approved as Honorary Vice-Presidents representing the Society at the exercises in Birmingham, September 16 to 21.

Permanent Franco-American Committee. Charles T. Main and George W. Fuller were approved to represent the Society on the Permanent Franco-American Engineering Committee.

STANDING COMMITTEES ON ADMINISTRATION

The annual reports were received and ordered printed for distribution at the Annual Meeting.

Finance Committee. The recommendations of the Finance Committee as embodied in the report of this committee published elsewhere in this issue were approved.

Meetings and Program Committee. Upon recommendations jointly of Meetings and Program Committee, House Committee and New York Section Executive Committee Rule 13 was amended to read:

> R. 13 (a) The features of the program outside of the professional and business sessions at any meeting of this Society in any city shall be in charge of a committee appointed or designated by the Meetings and Program Committee.
>
> R. 13 (b) The conduct of the professional and business sessions of the Society shall be in charge of presiding officers and assisting committees, appointed by the Meetings and Program Committee with the advice and consent of the President.

The President was authorized to appoint a committee of three for the purpose of drafting rules for conduct of meetings of the Society and its sections, and to report back to the Council, it being understood that this committee take into consideration the present rules of the Society.

Publication and Papers Committee. The Council accepted and approved the recommendations of the Publication Committee, which were requested by the Aims and Organization Committee, that MECHANICAL ENGINEERING be encouraged to publish matter of broader scope, including papers and articles that have not been presented at any meeting of the Society, news items of engineering interest, and information of general interest now presented in bulletins.

Commencing January 1, 1920, the annual subscription rates for MECHANICAL ENGINEERING were ordered to be as follows:

Members	$3.00
Non-members in United States	4.00
Non-members in Canada	4.50
Non- members in Foreign Countries	5.00

It was further ordered that notice be given of the amendment of all By-Laws and Rules that may be affected by the above change in rates.

Membership Committee. The following members who have paid dues for 30 years and reached the age of 70 years were declared members without dues:

Albert de Verastegui	Albert K. Mansfield
W. E. Elliott	Walter Miller
Francis L. Hand	H. B. Reelker
Edward I. H. Howell	J. H. Vaile
Franklin F. Krous	L. D. York

The following members who have paid due for 35 years were declared members without dues:

Charles S. Barnaby	O. W. Kelly
W. H. Bone	C. A. Knight
S. J. Clarke	Jas. B. Ladd
M. E. Cooley	Wm. T. Magruder
Geo. N. Cullingsworth	T. J. Mirkil, Jr.
Henry A. DuVillard	Thos. F. Rowland, Jr.
E. C. Felton	Peter Schwamb
A. O. Frick	Erwin W. Thompson
A. E. Hammer	Lyman A. Upson
John Henney	F. N. Willson
Ira N. Hollis	

Local Sections. Recommendations of the Committee on Local Sections with respect to petitions from Portland, Ore., and Seattle, Wash., were approved and the petitions granted.

Upon request of the Associated Engineers of Spokane, exchange of courtesies was granted.

Amendments to Constitution and By-Laws. Notice was given of proposed amendments to the Constitution and By-Laws as contained in report of the Constitution and By-Laws Committee to be distributed at the Annual Meeting.

Standing Committees

The annual reports were received and ordered printed and distributed at the Annual Meeting.

Professional and Special Committees

Boiler Code Committee. Interpretations Nos. 243, 244, 247 through 256, were received and ordered printed in MECHANICAL ENGINEERING.

Power Test Code Committee. The report of Committee on Power Test Codes was received and ordered printed for distribution at the Annual Meeting.

Upon recommendation of the committee, the following appointments were made: J. O. Lewis, on the Sub-Committee on Fuels; Hans Dahlstrand, on the Sub-Committee on Steam Turbines; and Walter A. Hall (representing R. H. Rice of the General Electric Company, as additional member on Sub-Committee on Centrifugal and Turbine Compressors.

International Standard for Pipe Threads. Upon the recommendation of the Committee on International Pipe Threads, the following appointments to the International Convention to be held in Paris November 10, 1919, were made: *Official Delegate,* Laurence V. Benet; *Technical Advisers,* Stanley G. Flagg, Bryant H. Blood, Arthur M. Houser, F. Hugh Morehead, Thomas Patterson, Julian E. Stark and Charles D. Terry.

Relations with Colleges. The Council received the reports on Junior and Student Prizes, and approved the recommendations as to the award of these prizes as contained in that report.

Hutton Memorial. The President was authorized to appoint additional members to the committee to make arrangements for the unveiling of the Hutton Memorial. The President subsequently appointed Mr. Worcester R. Warner and Mr. H. H. Suplee.

Appointment by President

Code of Ethics. The President announced the following Special Committee on Code of Ethics to report at the Annual Meeting: Messrs. A. G. Christie, *Chairman,* H. J. Hinchey, J. V. Martenis, R. Sibley and C. T. Main.

Joint Activities

American Engineering Standards Committee. The Constitution of the American Engineering Standards Committee, dated August 16, 1919, as presented by the representatives of the Society on that Committee was approved.

National Industrial Conference Board. A committee consisting of F. J. Miller, *Chairman,* Walter S. Russel, H. B. Sargent, Charles L. Newcomb and L. H. Strothman was appointed to investigate the functions of the National Industrial Conference Board, the kind of questions it takes up and the desirability of our remaining a member of the board. This committee was also requested to report on general policy of membership in other organizations.

Industrial Conference called by U. S. Government. Ira N. Hollis, *Chairman,* Fred R. Low and Max Toltz were appointed by the President to draft a telegram to President Wilson, suggesting that he recognize engineers in his meeting in Washington to discuss industrial conditions. This committee submitted the following telegram:

> At the convention of the American Society of Mechanical Engineers in session today in Indianapolis, the Council of the Society resolved to respectfully suggest representation from the engineering profession in the Industrial Conference. The Society ventures to hope that members of the engineering profession, having so many points of contact with labor and capital, are qualified to serve for the public and may be placed in a position to contribute their service to their country in this difficult period of readjustment. They respectfully nominate James E. Sague, Poughkeepsie, N. Y., former member of the State Public Service Commission, and Charles L. Newcomb of Holyoke, Mass.

Copies were sent to the Engineering Council, with the request that their officers use every means to secure the adoption of the spirit of the above resolution.

Vote of Thanks. The Council expressed its sincere appreciation to the Executive Committee of the Indianapolis Local Section for their specially felicitous Joint Indianapolis Meeting, and to all individuals who worked toward the success of the meeting.

Adjournment was taken to meet in New York on Monday, December 1, at 10 A. M., in connection with the Annual Meeting.

CALVIN W. RICE,
Secretary.

What is Going On

A special committee composed of Major Fred J. Miller, Chairman, Walter S. Russel, Henry B. Sargent, L. E. Strothman and Charles L. Newcomb has been appointed to investigate the question of the Society's membership in and affiliation with other bodies. The committee will first inquire into the subject of the Society's membership in the National Industrial Conference Board.

The Society is in receipt of an invitation to assist a commission of Swiss engineers who will visit this country in the forthcoming spring. This is the kind of request now frequently made, both by correspondence and by almost daily calls at the headquarters from gentlemen from foreign countries who are visiting this country.

The Engineering Council has made an appeal for funds, and it is strongly urged that members of the Society familiarize themselves with the aims, purposes and scope of work of the Council. The New York office of the Council is on the sixteenth floor of the Engineering Societies' Building, and Mr. A. D. Flinn, secretary, is always in attendance.

The Engineering Council announces that its efforts to have President Wilson appoint an engineer on the Second Industrial Conference, which he is expected to call, has apparently met with success.

The secretaries of three of the national societies arranged for a "get-together" meeting of engineers in Havana, Cuba, on Tuesday, December 9. Quite a large number of American engineers spend seven or eight months of the year in Cuba and there are also a number of engineers resident in the country, both English and native, as well as American, so that altogether it is believed there is a great opportunity for developing local organization activities on the island.

The Bureau of Standards has called a conference in Washington on December 8, "to further consider the methods of procedure in work on Safety Codes and methods for securing the coöperation of interested persons and organizations. The Conference is first to make a survey of the subject now covered by the Industrial Safety Code and the extent to which these codes are used; that is, the number of States who have adopted them, and the extent of their use in industry."

Inter-Professional Conference

The Inter-Professional Conference, organized at the invitation of the Post-War Committee on Architectural Practice of the American Institute of Architects to bring the professions together in order to plan more effective relations to each other and to the social problems of the day, convened in Detroit, Mich., on November 28 and 29.

At this meeting representatives of the various professions were brought together to discuss the desirability of forming a permanent national conference organization. The program of the discussion was divided into three parts: *(a)* Professional organizations, their functions and inter-relations; *(b)* Relation of the profession to the public; *(c)* Educational obligations of the professions.

The methods suggested for putting into effect the permanent national conference organization was through the establishment of inter-professional conference groups in the communities through the country, which local groups would be brought together annually through delegates.

A more complete report of the conference, in which Mr. Calvin W. Rice, secretary of this Society, participated as a member of the voluntary committee, will be given in a later issue.

The complete personnel of the Volunteer Committee on Organization was published in MECHANICAL ENGINEERING, Part 2, for November.

Cleveland Section Patent Committee Report

The following report of the Patent Committee of the Cleveland Section of the A. S. M. E. has been sent to all the other sections of the Society in the hopes of arousing sufficient public interest to secure an improvement in patent-office methods along the lines indicated in the report:

We favor the passage of legislation based upon the recommendations of the National Research Council and embraced in the following three bills:

H. R. 5011: Provides for the separation of the Patent Office from the Interior Department and its establishment as an independent bureau. This bill, if made a law, would take the Patent Office out of the position of one of a number of inconspicuous bureaus in a great Department, and set it forth in its proper light as one of the really important branches of the government, exercising a vast influence upon the material and industrial prosperity of our people. It is believed this change would greatly extend the activities of the Patent Office with a resultant stimulation of invention in various lines.

H. R. 5012: Provides for a Single Court of Patent Appeals. The purpose of this court is to shorten the processes of patent litigation and to unify the decisions rendered in patent cases.

H. R. 6913: Provides for increases in personnel and in the salaries paid in the Patent Office. This legislation is necessary owing to present outside competitive conditions, in order to obtain and retain the services of competently educated men as examiners. Good men are resigning to take positions with big industrial firms paying large salaries. The Patent Office has long been working without a sufficient force of competent men; its work is consequently in arrears, and the work is done too hastily to be reliable. The bill provides for a considerable increase in the working forces, and fixes a range of salaries for examiners, running from an entrance salary of $1800 up to $4000 for Primary Examiners with corresponding increases for higher officers.

We earnestly recommend approving action by other engineering bodies and that the American Society of Mechanical Engineers use their best efforts to further this legislation.

H. C. GAMMETER,
A. J. HUDSON,
A. G. MCKEE,
J. B. MERIAM,
H. J. SMITH.

French Engineering and Economic Commission

The French Engineering and Economic Commission, now touring this country with the Commercial Mission from Overseas which participated in the International Trade Conference held at Atlantic City on October 20-22 under the auspices of the Chamber of Commerce of the United States, visited New York City on November 20-24.

A reception committee consisting of the following gentlemen was appointed to receive them:

A.S.C.E.	Nelson P. Lewis George H. Pegram
A.S.M.E.	John W. Lieb Alexander C. Humphreys
A.I.M.E.	Charles F. Rand George D. Barron
A.I.E.E.	Prof. Walter I. Slichter L. B. Stillwell
A.C.S.	Dr. Wm. H. Nichols Harris Bewker
A.I.C.E.	L. H. Baekeland

This committee acted as members of the General Local Committee appointed by the Merchants Association of New York City on the request of the United States Chamber of Commerce.

Arrangements were made by the Committee for the party to inspect the Engineering Societies' Building.

The Mining and Metallurgical Engineering Society of America tendered a dinner to M. Eugene Schneider, which the national engineering societies were invited to participate. The occasion was the presentation of the Society's gold medal to M. Schneider.

M. de Freminville and M. Collin, both engineers at the Creusot Works, were members of the French Mission.

Section Meetings

ATLANTA:

October 28. Smoke Conditions in Atlanta, by Cecil P. Poole, City Mechanical Engineer. Department of Public Works, by Earl F. Scott.

November 24. A Broader Field for the Engineer, by Dean Dexter S. Kimball, Cornell University.

BALTIMORE:

November 13. Some Problems of the Canning Industry, by J. C. Talliaferro, Continental Can Company. Recovery of Oils as By-products of the Canning Industry, by Dr. J. H. Shrader, U. S. Department of Agriculture.

BIRMINGHAM:

October 11. Excursion to Fairfield Works, Tennessee Coal, Iron and Railroad Company, followed by dinner.

November 22. A Broader Field for the Engineer, by Dean Dexter S. Kimball, Cornell University.

BUFFALO:

October 6. Our Country's Call to Engineers, by President M. E. Cooley.

CHICAGO:

October 21. The Proposed $29,000,000 bond issue for Chicago.

October 29. Power Supply for the Future, by J. A. Steinmetz, Janney, Steinmetz & Co.

CLEVELAND:

November 25. The Open Court Trial of Patent Cases.

CONNECTICUT:

HARTFORD

October 20. The Engineering Problems Involved in the Distribution of Water in the City of Hartford, by Caleb M. Saville, Chief Engineer of the Board of Water Commissioners.

MERIDEN

November 7. Conflicting Claims on Piston Rings, by Maurice A. Michaels, Development Engineer, Foster Merriam & Co. The Manufacture of Shot Guns, by Walter A. King.

November 21. The Application of the Vacuum Tube to Radio Telegraphy, by Harold P. Donle, Radio Engineer, Connecticut Telephone and Electric Company.

NEW HAVEN

October 16. Industrial and Technical Points of the Rubber Industry, by Charles R. Haynes, U. S. Rubber Company.

CONNECTICUT SECTION MEETING:

November 19. 2.30 P. M., The Motor Truck in War, illustrated by slides and motion pictures, by Col. F. H. Pope, Motor Transport Corps, and Lieut.-Col. Arthur J. Slade.
6.00 P. M., Dinner.
7.30 P. M., The Motorization of the World's Traffic, by Kingsley G. Martin.

EASTERN NEW YORK:

October 27. Dinner and talk by E. W. Rice, Jr.

MID-CONTINENT:

October 30. 10.30 A.M., Report of Committee: What Should be the Content of a Course to Fit Young Men to become Petroleum Engineers?
12.00 M., Luncheon.
2.00 P.M., Construction and Operation of Pipe Lines for the Transportation of Natural Gas, by C. E. Brock, Superintendent, Gas Pipe Lines of the Empire Gas and Fuel Company. A Standard for Gasoline, Kerosene, and Motor Fuel Oil, by Dr. Edwin De Barr, University of Oklahoma. Problems Confronting the Engineering Colleges, by Professor A. A. Potter, Dean, School of Engineering, Kansas State Agricultural College. Effect of Compressed Air or Gas on the Production of Petroleum Wells, by W. S. Smith, Miller Gas Engine Company.
6.00 P.M., Dinner.
8.00 P.M., New Problems for Engineers, by Dr. Ira N. Hollis, Past President A.S.M.E. Natural Gas Gasoline Plants, by F. E. Rice, Chief Engineer, Phillips Petroleum Company. Appraisement of Oil and Gas Properties, by O. J. Berend, Vice-President Oklahoma Petroleum and Gasoline Company.
October 31. Inspection trip by automobile.

MINNESOTA:

November 3. The Preparation and Use of Powdered Coal, by Alonzo B. Kenyon.

NEW YORK:

October 9. The Human Factor in the Operation of Industry, by Prof. Henry R. Seager, Columbia University.
November 26. Management in Relation to Capital and Labor, by E. W. Hulet, Vice-President and General Manager White Motor Car Company.

ONTARIO:

November 14. Informal talk by Brig.-Gen. C. H. Mitchell.

PHILADELPHIA:

November 25. Smoker. Illustrated paper on colored photography, by Henry Hess. Informal talk by Joseph A. Steinmetz, President Philadelphia Engineers' Club.

ST. LOUIS:

October 15. Address by Dean Dexter S. Kimball, Cornell University.
October 16. Industrial Medicine, by Dr. Otto P. Geier, Cincinnati Milling Machine Company.

SAN FRANCISCO:

October 23. Flow of Oil in Pipe Lines, by Dr. W. F. Durand, Leland Stanford, Jr., University. Oil Pipe Line Design and Economics, by Herbert W. Crozier.

WASHINGTON:

November 19. Joint meeting under the auspices of the Society of Washington Engineers.

WORCESTER:

September 30. Methods of Sewage Disposal, by Harrison P. Eddy, Metcalf & Eddy (Illustrated).
October 28. Costs from Any Angle, by William R. Bassett, Miller, Franklin Bassett Company.

Eastern New York Section Has Its First Meeting

The first meeting of the newly organized Eastern New York Section of the A.S.M.E., which was held on the evening of October 28 in the Edison Club auditorium, Schenectady, N. Y., was exceptionally well attended and a highly successful one. This local branch of the Society is composed of members from Schenectady, Albany, Troy, Cohoes, Ballston, Amsterdam, Johnstown and Gloversville.

Mr. H. G. Reist of the alternating-current department of the General Electric Company presided. The principal speaker of the evening was Mr. E. W. Rice, Jr., president of the General Electric Company, who took as his subject "Present-Day Problems." Although an electrical engineer himself, Mr. Rice quoted Lord Kelvin's statement that "electrical engineering is 90 per cent mechanical engineering," to prove that he felt entirely at home at the installation of a local chapter of mechanical engineers.

Mr. Rice spoke of the remarkable opportunities for useful service that existed in the city of Schenectady for just such a local section, giving as the reason the amount of mechanical work done by the two large companies located there, the American Locomotive Company and the General Electric Company. He believed it especially appropriate that a forum and a rallying place for the mechanical engineers be started. He pointed out that it was quite unnecessary for him to indicate the lines along which progress is still possible in the field of mechanical engineering, but he ventured to take a short time in which to consider some of the problems which the world is facing largely as the result of the engineer's contributions to mankind. Mr. Rice went on to speak more specifically of remedies for these problems, and this part of his address appears in Section One of this issue.

PERSONALS

In these columns are inserted items concerning members of the Society and their professional activities. Members are always interested in the doings of their fellow-members, and the Society welcomes notes from members and concerning members for insertion in this section. All communications of personal notes should be addressed to the Secretary, and items should be received by January 15 in order to appear in the February issue.

CHANGES OF POSITION

WALTER C. LANGE has left the employ of the Doehler Die Casting Company, of Brooklyn, and is now a member of the engineering staff of the Hammel Oil Burning Equipment Company, New York.

HUBERT E. BAKER has resigned as chief draftsman, Manning, Maxwell and Moore, Inc., Shaw Crane Works, Muskegon, Mich., and is now connected with Alfred Box and Company, Inc., Philadelphia, Pa., as chief engineer.

GEORGE H. STEGMANN has resigned from the engineering department of the Individual Drinking Cup Company, New York, where he had been machine designer, and has accepted the position of mechanical engineer with Dwight P. Robinson and Company, New York.

F. RAYMOND JACKSON has severed his connection with the office of Gilbert C. White, consulting engineer, Durham, N. C., and is now associated with E. S. Player, of Greenville, S. C., manufacturing agents, selling power plant machinery and specialties.

H. C. ACKERMAN, formerly with the Gorham Manufacturing Company, Providence, R. I., as mechanical superintendent of their hand-grenade plant, has taken the position of master mechanic of the By-Product Coke Plant of The Colorado Fuel and Iron Company, Pueblo, Colo.

JOHN F. ALLISON has become secretary, treasurer, and works manager of the Spotswood-Allison Manufacturing Company, Petersburg, Va. He was formerly with the University of Pennsylvania, Philadelphia, Pa.

JAMES A. WILLARD, formerly chief draftsman of the Hopewell, Virginia Works, of the DuPont Company, has become associated with the Central Axle Company, Division of General Motors Corporation, Detroit, Mich., in the capacity of chief tool designer.

H. C. SHIELDS has resigned his position as western sales engineer for the Fuller Engineering Company and Fuller-Lehigh Company, and has been elected vice-president and general manager of the Arkansas Portland Cement Company, a new corporation recently formed in Arkansas.

JOSEPH H. HAZLEY, who for the past eight years has had charge of the eastern territory of Wilmarth and Mormon Company, Grand Rapids, Mich., in the capacity of sales engineer, service man, etc., has resigned and has become associated with the Jacobs Manufacturing Company and Rhodes Manufacturing Company, of Hartford, Conn., manufacturers of chucks and shapers.

A. H. MITCHELL has resigned from the Taft-Peirce Manufacturing Company, of Woonsocket, R. I., effective November 1, and is now associated with H. W. Cotton, Inc., of Brooklyn, N. Y., as second vice-president and sales manager.

CHARLES W. GUSTAVUS, whose work as construction engineer on the new south yard of the New York Shipbuilding Corporation, Camden, N. J., has been completed, has become connected with the construction department of the Detroit Edison Company, as mechanical engineer.

MANNING E. RUPP has resigned as general superintendent of the Gifford-Wood Company, Hudson, N. Y., and has accepted the position of sales engineer and assistant works manager with the P. B. Yates Machinery Company, Beloit, Wis.

E. L. CONSOLIVER resigned his position as assistant professor of mechanical engineering at the University of Wisconsin, Extension Division, to accept the position of director of the Department of Automotive Electrotechnics, School of Engineering of Milwaukee, Milwaukee, Wis.

CHARLES F. SCRIBNER has become associated with the Business Service Corporation of America, Chicago, Ill., in the capacity of vice-president and chief engineer. He was formerly consulting engineer for L. V. Estes, Inc., Chicago, Ill.

ALBERT S. BURRILL, until recently with the Marlin-Rockwell Corporation in its Tacony, Philadelphia, plant, has accepted a position as mechanical engineer with the Burroughs Adding Machine Company, Detroit, Mich.

GEORGE R. WOODS, who recently resigned from The Allied Machinery Company of America, New York, has been appointed manager of the New York office of R. S. Stokvis and Zonen, Ltd., of Rotterdam.

JAMES R. MCCALLUM has resigned his position as chief engineer with the tractor division of the Militor Corporation, Springfield, Mass., to accept a position as designing engineer with the Ordnance Engineering Laboratory at the Holt Manufacturing Company, Peoria, Ill.

CAPTAIN A. B. CHRISTEN, who before the war was an engineer with the Western Electric Company, has joined the sales department of the Anti-Corrosion Engineering Company of New York City.

EDWARD R. ABBOTT has joined the sales force of H. W. Cotton, Inc., of Brooklyn, N. Y. He will have charge of the western business, making his headquarters for the present in New York City, and later at Cleveland, Ohio. Mr. Abbott was formerly with the Taft-Peirce Manufacturing Company, of Woonsocket, R. I., as a member of the sales force of their New York office.

ANNOUNCEMENTS

DUGALD C. JACKSON and E. L. MORELAND announce that after their absence in France in the Corps of Engineers, U. S. A., they have resumed their practice as consulting engineers, under the firm name of Jackson and Moreland, with offices in Boston, Mass., and will carry on the practice formerly conducted in association with William B. Jackson under the firm name of D. C. and William B. Jackson.

JOHN E. TAYLOR, Master Engineer Senior Grade, Headquarters Transportation Corps at Large, A. E. F., who served in France as general supervisor of air brakes of the 14th Grand Division of the U. S. Railways, has been honorably discharged and has returned to his work with the Locomotive Superheater Company, New York.

WILLIAM D. ENNIS has been designated a consulting member of the technical advisory committee of the War Claims Board. This Board has been designated to act for the Secretary of War in the settlement of claims arising from the suspension of contracts following the armistice.

CHARLES W. TUBBY, formerly St. Paul sales manager, Worthington Pump and Machinery Corporation, has been transferred to the management of the Seattle office of the company.

MARK T. CANTELL, consulting engineer of Winnipeg, Manitoba, Canada, has been elected to membership in the Royal Societies Club, London, England, by reason of his contributions to the science of engineering.

HARRY HIMELBLAU has started a consulting engineering practice, in addition to his duties as mechanical engineer with the Armour Grain Company, Chicago, Ill.

WALTER P. ALEXANDER, Captain, Inspection Division, Philadelphia District, Ordnance Office, is in charge of the newly opened branch office of Starkweather and Broadhurst in Springfield, Mass. He will handle the business of the company in western Massachusetts and vicinity.

JEROME STRAUSS, First Lieutenant, Ordnance Department, Inspection Division, is now assistant chief chemist and metallurgist, U. S. Naval Gun Factory, Washington, D. C., in charge of chemical and metallurgical laboratories.

BERNARD O. KNIGHT after two years of engineering activities with the Air Service, both in Washington, D. C., and Dayton, Ohio, has resigned to become designing engineer for the G. A. Gray Company, manufacturers of metal planers, Cincinnati, Ohio.

ROLAND F. HETZEL is now in charge of the castings department of the Ames Shipbuilding and Drydock Company, Seattle, Wash.

J. BENTON PORTER, ship propulsion specialist, announces that he has been transferred from the Philadelphia office to the New York office of the General Electric Company.

CLARENCE REEDS, formerly consulting engineer with John A. Stevens, Lowell, Mass., announces the organization of the firm of Reeds and Thorpe, power engineers, with offices in Hartford, Conn.

E. C. SHRINER, JR., for 23 months Lieutenant in the Ordnance Department, U. S. A., is now connected with the brass goods department of Manning, Maxwell and Moore, Inc., with offices in Pittsburgh, Pa.

COLONEL W. A. STARRETT has joined the George A. Fuller Company, New York, and will serve as vice-president and director.

JAMES GUTHRIE, consulting motor-vehicle engineer of Cleveland, Ohio, and former ordnance engineering representative in the Michigan district, has been commissioned a Lieutenant-Colonel in the Reserve Corps of the U. S. A. He was formerly a Major in the Old Reserves, and served through the war with the rank of Major.

J. R. PEARSON, vice-president and general manager of the Acme Machine Tool Company, Cincinnati, Ohio, severed his connection with the concern November 1.

N. E. PHILPOT, formerly Ensign, U. S. R. F., has been released from active duties as assistant naval inspector of ordnance, and is now connected with The Smith Gas Engineering Company, Dayton, Ohio, in the capacity of mechanical engineer.

AMBROSE SWASEY, Past-President and Honorary Member of the Society, has been elected to membership in the American Philosophical Society, and has also been made an Honorary Member of the New Hampshire Branch, as well as the main Society of the Cincinnati.

GEORGE M. BRILL announces that following an interruption of his consulting practice in Chicago, including two years of war work, he has resumed his practice in New York. He will continue to specialize in the engineering of industrial plants and processes, improvements in operation and financial investigations. Temporary office will be in the Singer Building, New York. After May 1, 1920, he will be located in the Guaranty Fifth Avenue Building.

APPOINTMENTS

CHARLES W. LYTLE, of the Georgia School of Technology, Atlanta, Ga., has been appointed assistant professor of vocational education, College for Teachers, University of Cincinnati, Cincinnati, Ohio.

G. L. KOLLBERG has been appointed manager of the pumping engine department of the Allis-Chalmers Manufacturing Company, Milwaukee, Wis. Mr. Kollberg was formerly engineer of this department.

EARL E. EBY, sales manager, Hyatt Roller Bearing Company, industrial bearings division, has been appointed to the Board of Directors, of Hyatt, Ltd., a new company formed to market the Hyatt bearings in Europe. Mr. Eby will devote his entire time to this work, with headquarters in New York.

PAUL J. KIEFER, Lieutenant (Junior Grade), U. S. N., has been appointed assistant professor steam engineering, College of Engineering, University of Illinois, Urbana, Ill.

WALTER J. MAGUIRE, formerly engineer of tests for the Pacific Coast Steel Company at Seattle, Wash, has been appointed district sales manager for the same company at Portland, Ore.

CAPTAIN E. R. GLENN, Ordnance Reserve Corps, U. S. A., has been appointed production manager for the Simplex Valve and Meter Company, of Philadelphia, Pa.

JAMES A. HALL has been appointed lecturer in machine design at Harvard University, Cambridge, Mass., in addition to his duties of assistant professor of mechanical engineering at Brown University, Providence, R. I.

EMPLOYMENT BULLETIN

THE SECRETARY considers it a special obligation and pleasant duty to make the office of the Society the medium for assisting members to secure positions by putting them in touch with special opportunities for which their training and experience qualify them, and for helping any one desiring engineering services. The applications and positions listed below combine the services of the Society and of the Engineering Societies Employment Bureau, Room 1605, Engineering Societies Building.

POSITIONS AVAILABLE

Stamps should be inclosed for transmittal of applications to advertisers; non-members must accompany applications with a letter of reference or introduction from a member; such reference letter will be filed with the Society records.

INSTRUCTORS: All engineers willing to consider teaching positions are invited to register with Engineering Societies Employment Bureau. The Bureau has been called upon to fill more positions, varying in grade from laboratory assistant to heads of department in various engineering and technical schools of this country, than it has been able to do from among the men now registered. Blanks for purpose of registration and information regarding the Bureau may be had by addressing W. V. Brown, Manager, 29 West 39th Street.

MALLEABLE FOREMAN to become Assistant Superintendent, if ability is shown. Must have thorough molding experience and some knowledge of furnace operation and mixtures of iron. College graduate preferred. Excellent opportunity for man willing to work. R-1727.

SALES ENGINEER: Graduate Mechanical and Steam Engineer from representative engineering college; must be of good appearance, etc.; with manufacturers of special system applied to power and heating plants. Salary $175 per month; more, if qualifications warrant it; all expenses paid, traveling east of Chicago. Openings for several men. R-1872.

SALESMAN: Must have had engineering training, but must be primarily salesman. Company is large merchandising organization, doing business all over world. Field of operations will be oil-well districts. Openings for several men. Location, Ohio. R-1873.

MECHANICAL DRAFTSMAN: First-class draftsman, capable of laying-out mechanical work and building construction, estimating quantities, and also supervising work, if occasion demands. Must have initiative and require minimum amount of supervision. Work is in connection with pulp and paper industry, of permanent nature for man with proper qualifications, and with good opportunity for advancement. Location, Quebec, Canada. R-1876.

MACHINE DESIGNER AND DRAFTSMAN: Experience in designing tools and jigs for manufacturing air and ammonia-compressor machinery; experience also in designing air and ammonia compressors preferred. Location, Ohio. Salary, minimum $150, but depends finally on man. R-1877.

INSTRUCTOR IN MECHANICAL ENGINEERING: Must be technical graduate, preferably with some instruction experience in machine design and gas engines; fairly young man preferred. For single man, living conditions are especially convenient and reasonable. Both school and department are young and growing. Location, Texas. Salary, $1800 per year. R-1882.

MECHANICAL ENGINEER: Must have special qualifications including advanced courses in physics, or graduate research in mechanical engineering, to take charge of definite phase of instrument inspection and calibration work in instrument-inspection department of large well-known tire and rubber company. Location, Ohio. R-1883.

ASSISTANT MECHANICAL ENGINEER: Must be technical graduate and capable of handling correspondence and taking charge of drafting room. Experience on gear-head machinery desired. Will be assistant to president. Location, Indiana. Good future. R-1889.

INSTRUCTOR IN MECHANICS AND MATERIALS TESTING: Rapidly growing technical school anticipates the necessity for considerable increase in staff of instructors in elementary mechanics, strength of materials and materials-testing laboratory. It is probable that one appointment will be made about January, 1920, and the others during the summer of 1920. Letters of application should state training and experience and salary now received. Location, Ohio. R-1891.

WATER-WORKS ENGINEER: Experience along lines of design and construction of works for water supply and purification in connection with design and construction of filtration plants for large cities. Location, Ohio. R-1896.

WORKS MANAGER: Experience in adding and typewriting machinery or small interchangeable parts. Location, Connecticut. R-1899.

CHIEF ENGINEER: Experience in adding and typewriting machinery or small interchangeable parts. Location, Connecticut. R-1900.

MECHANICAL ENGINEER: Experience for work covering wide range including power-plant maintenance and modification under changing circumstances, underground piping systems and mechanical equipment of buildings outside of industrial machinery, as well as supervision of mechanical inspectors. Location, Philadelphia. Government position. Salary, $9.60 per diem. R-1905.

CIVIL ENGINEER: Must be capable of taking full charge of complete design and preparation of specifications for steel concrete, steel brick and wooden structures of industrial type, together with heating, plumbing and sewerage in connection with same. Preferably college graduate, 30 to 38 years of age, with at least six or seven years' experience solely devoted to this line of work. Location, Ohio. R-1908.

ASSISTANT ENGINEER OF POWER: Technical graduate; construction experience and familiarity with operation and power cost accounting essential. Must be able to supervise design and construction of power-house changes and additions; familiarity with steel work and piping layouts required. Apply in own handwriting. Location, Missouri. Salary, $200 to $250 per month, depending on man. R-1911.

POWER DRAFTSMAN: Must be neat, accurate and good letterer. Some experience with steel work and piping layout required. Send sample of work, and apply in own handwriting; openings for two men. Location, Missouri. $125-175 per month, depending on man. R-1912.

ASSISTANT ENGINEER OF EQUIPMENT: Must be technical graduate and familiar with car construction and various equipment in use on electric systems; able to prepare specifications and supervise new car construction, and conduct tests and special studies. Apply in own handwriting. Location, Missouri. Salary, $200 to $250, depending on man. R-1913.

DRAFTSMAN: Some experience on rolling stock and car construction for general work. Location, Missouri. Salary, $125 to $150. R-1914.

SALES ENGINEER: Position is with welding company, selling welding equipment and supplies, as torches, decarbonizers, welders, all kinds of welding rods and fluxes and engaging in welding and cutting business. Openings for several salesmen. Location, Boston, Mass. R-1915.

REINFORCED-CONCRETE DESIGNERS: Must be graduate of high-grade engineering school and proficient in theoretical engineering, with at least three years' experience in designing important structures of reinforced concrete and structural steel and well informed in latest methods of design; 27 to 40 years of age. Only experienced designers should apply; openings for several men. Besides straight salary are included transportation one way and leave privileges which amount to about 10 per cent in addition salary. Location, Philippine Islands. $2500 to $2750 per year. R-1922.

RECENT M. E. GRADUATE: Young technical graduate to take up theoretical design work on steam turbines; practical experience not necessary. Location, New York State. R-1925.

MECHANICAL DRAFTSMAN: For large machine-tool work, as lathes, planes, etc. Location, New Jersey. Salary, $40 up. R-1928.

WORKS OR PRODUCTION MANAGER: Must be first-class man and have experience in the manufacture of automobile bodies. Location, New York City. Salary depends on experience. R-1930.

DRAFTSMAN: Must have knowledge of shop layouts. Government position. Location, Philadelphia. R-1936.

MECHANICAL ENGINEER: Young man, capable of planning boiler installations, making estimates and proposals and attending to installation of boilers. Will be given charge of as much work as he can handle after he has become sufficiently experienced to be trusted. Location, Philadelphia. R-1937.

MECHANICAL ENGINEER: Young American, capable of taking charge of up-keep of machinery and power plants of several crude-rubber factories; need not have degree, but must be thoroughly familiar with machine-shop practice and be able to take hold of existing simple installations and bring them up to maximum production; must be capable of making simple extensions to existing plants, and laying out and directing work of installation of simple new machinery. Should be capable of directing work of mixed labor. Opportunity for bright, capable American to connect with Chinese commercial house of highest standing commercially and progressively. Location, Singapore. R-1938.

ENGINEERING AND SALES REPRESENTATIVE: Manufacturer of power-plant and heating equipment desires to establish connections in several centers. Preference given to individuals with engineering experience already established in these centers who could combine such representation with that of one or two non-competitors in the same field. Give details of training, experience, present connections, terms, etc. Openings for two men. Location, Western New York and Texas. R-1939.

TECHNICAL ADVERTISING MANAGER: Must have thorough knowledge of power-plant practice and first-class record of past service. Position is with manufacturer of soot blowers. Unusual opening for a man

with brains, and desire to settle permanently. State minimum salary. Location, Detroit. R-1940.

INSTRUCTOR IN MECHANICS AND LABORATORY ASSISTANT: Must be young graduate engineer; to teach mechanics and assist in laboratory for testing materials; teaching experience desired, but not necessary. Openings for two men, one man wanted at once and the other February 1, 1920. Apply by letter. Location, Pennsylvania. R-1942.

SUPERINTENDENT OF POWER: Graduate engineer, familiar with blast-furnace plant, including boilers, blowing engines and turbo-generators. Must be familiar with electric-line work and motor applications. Location, Alabama. Salary, $6000 to $7000. R-1943.

ELECTRICAL AND MECHANICAL ENGINEERS: Experienced in work of designing and drafting for lock, dam and power-house structures. Openings for several men on Government work. Location, Alabama. R-1945.

DESIGNING DRAFTSMAN: Technical training and wide experience; familiarity with turbine practice desirable. Permanent position and good chances for advancement for man with proper qualifications. State age, education, experience and salary expected. Location, Pittsburgh, Pa. R-1946.

MECHANICAL DRAFTSMAN: Preferably young man with reasonable amount of experience in mechanical drafting and, if possible, some experience in mining and map work. Location, Mexico. Salary, $150 per month to start. R-1953.

MECHANICAL DRAFTSMAN: Must be familiar with detail design of steel tanks, steel plate construction and light structural work. Apply by letter giving age, experience in detail, salary expected, when available, etc. Location, Maryland. R-1957.

WRITER: An able writer on steam-power and machine-tool subjects for preparation of catalogs, circularizing literature and advertisements in our advertising agency; preferably, but not necessarily, familiar with printing details. Permanent position and opportunity for advancement to man who is competent, resourceful and has capacity to produce. Location, New York City. R-1959.

STRUCTURAL STEEL DRAFTSMAN: Position is with fabricators of structural steel, doing all classes of work in this line. Permanent position for right man; 44 hours per week; straight time for overtime, if any is done; excellent working conditions and opportunity for advancement. Location, Pennsylvania. Salary, up to $1 per hour. R-1964.

SALES ENGINEER: Preferably technical graduate with experience in conveying machinery. Opportunity exceptionally good. Location, New York City. R-1965.

INSTRUCTOR IN MECHANICAL DRAWING AND DESCRIPTIVE GEOMETRY: Must be practical draftsman for position with educational institution endeavoring to teach drawing to freshman class as it is done in commercial drafting office. Technical graduate preferred, non-graduate could arrange to work for degree on the side. Salary, $150 per month. Location, Montana. Open January 1, 1920. R-1969.

MECHANICAL METER REPAIRMAN: Maintenance and repair of all mechanical meters, consisting of G. E. steam-flow meters, Bailey boiler meters, venturi meters, recording pressure gages, draft gages, etc., in large plant. Location, Ohio. R-1970.

ELECTRICAL SALES ENGINEER: Must have had technical and practical experience along all electrical lines, must be competent to make layouts of factories, industrial plants and power plants of medium size and be able to present the complete equipment of machinery from sales standpoint. Company would expect man to make proposition to start on reasonable salary until he has demonstrated ability. Location, Seattle, Wash. R-1971.

DESIGNING DRAFTSMAN: Experience on optical and mathematical instruments, instruments of precision, especially on range finders. Location, Massachusetts. R-1973.

SALES ENGINEER: Must be familiar with lubricants; must speak and understand Italian. Location, Italy. R-1975.

DESIGNERS AND LAYOUT DRAFTSMEN: Must be first-class men on heavy machinery such as tractors, harvesters, etc. Openings for several men. Location, Illinois. R-1977.

INSTRUCTOR IN MECHANICAL ENGINEERING: Mechanical engineer to teach classes in machine shop, foundry and industrial engineering. Should have completed collegiate course in mechanical engineering at good technical college and should have some practical experience preferably in metal-working lines. Able to take direct charge of classes in foundry, pattern making, and machine-shop work, and have supervision over other shop instruction, able to give instruction in class-room subjects on industrial engineering. Would receive the title of Assistant Professor in mechanical engineering. Location, Texas. Salary, $1800 for nine months. R-1978.

MACHINE DESIGNER: Work will be on rubber machinery; moderate machine-tool experience necessary. Location, New Jersey. R-1981.

SALES ENGINEER: Preferably with experience as chief marine engineer, or graduate engineer, familiar with internal-combustion engines and with automobile trade. Must be good salesman, of good appearance and possess ability to meet best people. Salary, $2700 to start. Headquarters probably Detroit, Mich. R-1984.

MECHANICAL ENGINEER: Technical graduate, preferably with three or four years' experience along following lines: power plant, air conditioning, elevating and conveying machinery. Location, Pennsylvania, about 100 miles from N.Y.C. Salary, $250 to $275. R-1987.

SQUAD BOSS (DESIGNER): Experience in building design and, if possible, also in power-plant work, air conditioning and elevating and conveying machinery. Openings for 2 men. Location, Pennsylvania, about 100 miles from N. Y. C. Salary, $220 to $250. R-1988.

MECHANICAL DETAIL DRAFTSMAN: Must have experience of general nature. Several detailers wanted. Location, Pennsylvania. Salary, $150 to $175. R-1989.

POWER DRAFTSMAN: Familiar with power-house design, construction and operation. Location, Providence, R. I. R-1990.

MECHANICAL ENGINEER: Capable of designing automatic machinery; one who already has a record of achievement and large and long experience in this line desired. Attractive salary will be paid. R-1993.

MACHINE DESIGNER AND DRAFTSMAN: Must have experience in automatic-machine design and be familiar with small wire-forming machinery, like that used in the manufacture of wire hooks and eyes, safety pins, etc. Location, Philadelphia, Pa. R-1994.

DESIGNING ENGINEER: High-grade designer, familiar with centrifugal compressors, steam turbines, and special or electrical machinery. Location, Massachusetts. R-1995.

MACHINE TOOL DESIGNER: General experience in designing machine tools. Location, New York City. R-1998.

MACHINE DESIGNER: To design and develop automatic and semi-automatic machine for manufacture of small interchangeable parts in quantity. Excellent opportunity for high-grade technical man to establish permanent connection with large corporation. Give full details as to experience, salary desired, etc. R-2000.

PROFESSOR OF MECHANICAL ENGINEERING: To arrange courses, organize program for work, and make estimates of cost of equipment and materials necessary for shops and laboratories, for position in middle western university. R-2002.

TOOL DESIGNER AND DETAIL DRAFTSMAN: Positions are with manufacturer of instruments, such as speedometers, etc. Location, vicinity of New York City. R-2004.

RECENT M. E. GRADUATE, who has had some experience in steam engineering, or at least good knowledge of same, desired by company building and marketing surface and jet condensers, closed heaters for all services, evaporators, distillers, expansion joints, evactor air pumps, etc. Year or so of practical experience desirable, but not absolutely necessary, for man with the right foundation. Location, Buffalo, N. Y. R-2007.

DRAFTSMAN AND ENGINEERS: Familiar with power-plant work. Several men wanted in connection with design and construction of several large power plants. Location, Milwaukee, Wis. Salary, $125 to $175, according to ability and experience. R-2012.

MECHANICAL ENGINEER: Especially fitted to make studies and drawings of equipment layouts and shops for manufacture of forgings, brass and steel drawing, machining of small brass parts, etc. Drawings will be made of foundations, location of machines, counter-shafting, line shafting, etc. Location, Philadelphia. R-2018.

INSTRUCTOR IN RADIO TRANSMISSION to teach theory and practice of radio transmission, including theory of transient electric phenomena. Graduate of first-class engineering college with at least one year of graduate work including mathematical theory of electricity, particularly of radio and transients preferred. Appointment will be for remaining months of this college year, at the rate of $2000 for nine months. Location, Middle West. R-2019.

GENERAL ENGINEERING DRAFTSMAN: Familiarity with general plant layout work, piping, industrial equipment, etc. Location, vicinity of New York City. Salary depends upon man. R-2021.

MECHANICAL DRAFTSMAN: Familiar with power-plant work. Application by letter stating experience and qualifications. Location, vicinity of Chicago. Good salary. R-2022.

FURNACE DESIGNER: High-grade man with experience on industrial-gas and oil-burning furnaces, also on fuel-oil systems for power plants. Two openings. Location, Massachusetts. R-2023.

ENGINEER OF TESTS: Ability to test steam plants for efficiency both before and after improvements have been applied. R-2027.

DESIGNERS: Must be able to solve engineering problems in connection with design of small tools and fixtures for gear hobbers and slotting machines. Several openings. Location, Connecticut. Salary, depends upon man. R-2028.

SUPERINTENDENT OF HARDENING AND HEAT-TREATING ROOM: Should be experienced and thoroughly capable to take charge of department and coöperate with manufacturing departments in every way. Work is chiefly on regular production of small parts with some special tool-room work. Department consists of six furnaces. Location, New York State. R-2029.

MANAGER FOR DISTRICT OFFICE: Thoroughly familiar with building trades, and especially with reinforced-concrete industry. Should be competent to oversee all details connected with operation of district office. Position is with construction company, doing large volume of business in erection of forms, both wood and steel, for reinforced concrete buildings, and also erection of concrete reinforcing steel. Several openings. Salary, $3000 to $5000 per year. R-2036.

ESTIMATING AND COST ENGINEER OF BUILDING CONSTRUCTION: Should be particularly conversant with reinforced-concrete work, cost of form work, cost of assembling and erection of reinforcing steel, etc. Openings for several men. Location, Pittsburgh, Pa. R-2037.

SUPERINTENDENT OF CONSTRUCTION: Must be thoroughly familiar with operation in construction of reinforced concrete buildings. Duties will include direct supervision of contracts in field; will be held responsible for carrying out directions of management and for organizing field forces, for dealing directly with, and employing labor. Several openings. Location, Pittsburgh, Pa. R-2038.

FACTORY SUPERINTENDENT: Extensive experience as factory executive such as would fit applicant to manage machine shop manufacturing wire-plant machinery and cigarette machinery. Location, Connecticut. R-2045.

CHIEF DESIGNER, extensive experience on small machine parts such as used in cigarette machinery. Location, Connecticut. Salary depends upon man. R-2046.

AUTOMOBILE ENGINEER: Must thoroughly understand designing, mechanical construction and assembling of motor cars. Man living in vicinity of Boston preferred. R-2054.

MANUFACTURING EXECUTIVE; thoroughly experienced manufacturing executive to take charge of plant employing approximately five thousand men. Must be technically trained and able to guide design as well as intensive, progressive manufacture of varied line of power equipment, including gas engines, pumps, etc. Give full details of age, experience, training, salary expected, in first letter. Location, Middle West. R-2055.

ELECTRICAL-ENGINEERING EXECUTIVE: Experienced executive to take charge of design and manufacture of line of electrical machinery with old-established concern. Prefer technically trained man. Must have experience in electrical line. Give full details in first letter. Location, Middle West. Salary depends upon experience. R-2056.

MECHANICAL DRAFTSMAN, capable of working independently from data and sketches and of showing individuality and initiative. Technical education desirable but not necessary. Work is on the board. The company's product includes condensers, pumps, general power-plant equipment, piping layouts, general machine design and plant improvement. Two openings. Location, New Jersey. $35 per week to start. R-2057.

(A) PRODUCTION MANAGER, (B) CHIEF ENGINEER, (C) CHIEF INSPECTOR with extensive experience and proved ability in typewriter, adding or similar machine-manufacturing fields. Location, Pennsylvania. R-2059.

CHIEF DRAFTSMAN, valves and fittings. Growing concern needs experienced man on design of product, machines and equipment for same. Executive ability necessary. State experience in detail, salary expected and when you can report for duty. Location, New York State. R-2060.

DESIGNER: Must be familiar with up-to-date factory methods, tolerances, checking, etc. Location, Newark, N. J. Salary, about $45 per week. R-2064.

TOPOGRAPHICAL DRAFTSMAN, experience in topographic drawing. Location, Mexico. Salary, $150 and all expenses. R-2067.

CONTROL AND EQUIPMENT ENGINEER: Experienced man, about 35, with ability to take complete set of drawings, such as truck or tractor, select efficient modern machine-tool equipment for certain production, and design complete set of efficient jigs, tools, fixtures; man must be real doer, with up-to-date experience on this class of work; new plant, small town, 18 miles from Philadelphia; to receive reply, state full details, with previous earning capacity. R-2068.

ASSISTANTS IN METALS TESTING LABORATORY, College graduate desired. Location, Urbana, Ill. R-2069.

DRAFTSMAN, with experience in surveying, structural and mechanical drawing. Location, Virginia. R-2070.

EDITOR: Young graduate engineer about 25 years of age for general publicity work. Location, New York City. R-2072.

INSTRUCTOR IN PHYSICS: An engineering college near New York City desires instructor in engineering physics. Position offers advantage of thorough grounding in science and excellent opportunity for advancement to satisfactory commercial position. R-2075.

ASSISTANT PROFESSOR OF MATHEMATICS qualified to assist temporarily in physics. Duties will consist of teaching 20 hours per week. Salary, $200 per month. Location, Florida. R-2076.

FOUNDRY SUPERINTENDENT: Must be competent to take charge of foundry employing about 80 men. Location, New York State. R-2077.

CHIEF DRAFTSMAN, by Pacific Coast concern manufacturing large line of internal combustion engines. Permanent and attractive position with opportunity to advance to chief engineer is offered to energetic and capable designer. Some knowledge of heavy-oil engines desirable, but not the deciding factor. State experience in detail, references, age, nationality and lowest initial salary. All communications strictly confidential. R-2078A.

SHOP FOREMAN: Must be experienced in management of small machine shop for position in department composed of about 30 machines. Location, Seattle, Wash. R-2078B.

ASSISTANT MANUFACTURING SUPERINTENDENT: Should be thorough mechanic, good executive and a man of ideas — able to devise ways and means of manufacture, and have a thorough knowledge of handling of metals. Important would be deep drawing of steel. Man of integrity, a worker, diplomatic and thoroughly up-to-date. Would prefer a married man, around 35 years of age. To receive attention, give full details as to personality, experience, references and salary expected. Location, Western Massachusetts. R-2079.

ASSISTANT PROFESSOR OF ELECTRICAL ENGINEERING: Middle Western University, electrical engineering department, desires to appoint, before February 1920, an assistant or associate professor of electrical engineering qualified to assume charge of central station and electric railway courses. Experienced engineer who has carried on investigative work resulting in contributions to the art is desired. R-2080.

INSTRUCTOR IN ELECTRICAL ENGINEERING: Middle Western University, electrical engineering department, will have opening in February for instructor in Electrical Engineering. Man with unusually thorough grasp of fundamental electrical theory and some experience in engineering of teaching field is desired. Salary, $1500-$1800 for nine-month school year. R-2081.

DRAFTSMAN: Education as chemist or as chemical engineer, and one or two years' experience in chemical industry. Experience at explosives-manufacturing plants would be asset. Application by letter. Position is with government bureau. Location, New Jersey. R-2083.

DRAFTSMAN: First-class mechanical draftsman with experience in industrial smelter and refinery plants. Applicant should have experience in structural design, and be thoroughly competent to lay out both buildings and machinery. Application by letter. Location, New Jersey. Salary, about $45 per week. R-2084.

DRAFTSMAN, thoroughly capable and reliable. Duties will consist of preparing drawings for buildings, including plumbing, sewerage and ventilating systems, track and trench work, roadways, paving, etc. Location, Cleveland, Ohio. R-2085.

CRANE OPERATOR. In operation of locomotive crane, being manufactured by Industrial Works of Bay City, Mich., most important part of work will be in handling of reinforced concrete piles, 2 ft. x 2 ft. x 110 ft. in length, and weighing 35 tons each, to be lifted by a four-point suspension. Crane will then be propelled on wide-gage track to pier, negotiating curve and switch en route, where load will be lowered to scow. Erection of this crane will also be handled by operator. Location, Manila, Philippine Islands. R-2096.

DRAFTSMAN with experience in dies for light sheet-metal work in punch and draw presses. Location, Ohio. R-2098.

RECENT technical graduate with some practical engineering experience for engineering correspondence, bulletin and price-list work on pumping machinery. State education, experience, salary expected, and how soon available. Service man preferred. Location, Massachusetts. R-2100.

DESIGNER: Must be experienced on steel-plant and rolling-mill work. Salary, $225 per month. Location, Ohio. R-2107.

INSTRUCTOR IN MECHANICAL ENGINEERING: Duties will include recitation and laboratory work in steam gas engines and steam boilers. Previous teaching experience desirable. Beginning salary, $2000 per year. Location, Middle West. Enclose recent photograph, if possible, with application. R-2105.

CHEMICAL ENGINEER with thorough technical training, preferably in organic chemistry, and mechanically inclined. Work is in miniature plant of large manufacturing concern where all new processes are tried out before they are put into operation on a large scale. Location, Cleveland, Ohio. R-2260.

ANALYTICAL CHEMISTS for industrial work. Two openings. Location, Cleveland, Ohio. R-2260A.

EXPERIENCED DESIGNERS AND DRAFTSMEN, on reinforced concrete buildings and structural steel buildings; also designers and draftsmen experienced in conveying machinery such as would be used in an automobile plant. Several openings. Location, Flint, Mich. R-2261.

CHIEF DRAFTSMAN: Must be familiar with general machine design, and big and broad enough to handle problems of power and plant engineering. Office now employs about ten men. Excellent opportunity for future advancement. Location, Massachusetts. R-2262.

YOUNG ENGINEER with experience in mining, railway work and land lines. Must be fair draftsman and willing to grow up with a large operation. Salary, $150 per month start. Location, Alabama. R-2263.

MECHANICAL DRAFTSMAN with understanding of foundry pattern work. Salary, $30 per week. Location, New Jersey. R-2264.

REINFORCED CONCRETE DESIGNER for factory building work. Must know flat-slab construction. Salary, $50 per week up. Location, New York City. R-2265.

STRUCTURAL STEEL AND ARCHITECT ENGINEER, 30 to 35 years old, for designing and drafting work. Permanent position. Salary, $200 per month. Location, New York City. R-2267.

SALES ENGINEER for special power plant auxiliary equipment. Headquarters at New York City. R-2268.

ASSISTANT ENGINEER with mechanical and electrical experience for design, experimental and research work. Marine experience would be useful. Location, Massachusetts. R-2269.

LABORATORY ASSISTANT for flotation work on custom ores. Location, New York City. R-2270.

YOUNG MECHANICAL ENGINEER, from 25 to 30 years of age; preferably with experience in oil plant work. Location, New Jersey. R-2271.

An AMBITIOUS MAN with about three or four years' experience in designing of commercial electric motors, also specifications and production methods in manufacturing. Location, Maryland. R-2273.

RECENT GRADUATE IN MECHANICAL ENGINEERING for development for sales work. Good future. Location, New York City. R-2274.

FIRST-CLASS DESIGNER familiar with highway and city improvements including all branches of both. Salary, $175. Location, Kansas. R-2275.

ESTIMATOR with experience in the construction of refrigerating plants, particularly of the compression type, and in estimating. A draftsman with experience on the layout of refrigerating plants and equipment would be considered. Location, Cincinnati, Ohio. R-2276.

GENERAL MANAGER for plants of a large manufacture of artificial wall boards. Would supervise and coordinate the work of the various plants from the grinding of the wood pulp to the finished product. Man of some standing who has already achieved a certain amount of reputation desired. R-2277.

DIESEL DESIGNERS are wanted by a well-established company now organizing a Diesel Motor Department for both stationary and marine Diesel Motors. Location, Ohio. R-2278.

DRAFTSMAN familiar with automatic machine design. Two openings. Location, New York City. R2279.

EXPERIENCED LOCOMOTIVE DESIGNERS, DETAILERS, AND TRACERS wanted by firm of locomotive builders. Detailers and tracers without locomotive experience will be considered. Location, Penn. R-2280.

ASSISTANT TO PLANT ENGINEER: Mechanical Engineer, with general plant engineering experience, to have supervision over the operation and maintenance of power plant, compressed air, gas, ventilation and heating systems. Man with considerable initiative and intelligence desired. Location, Bridgeport, Conn. R-2281.

RECENT ENGINEERING GRADUATE for surveying, drafting, construction and power plant work and general mill engineering. Location, Passaic, N. J. R-2282.

TOOL, JIG AND FIXTURE DESIGNER, must be able to use trigonometry with ease; work is not unusually difficult. Salary, about $35 per week. Location, New York City. R-2283.

MECHANICAL ENGINEER for research, experimental and development work on artillery ammunition. Man with considerable research experience and familiarity with standard manufacturing processes desired. Government position. Location, Philadelphia. R-2284.

DRAFTSMAN, for Plant Engineering Division, of Industrial concern; Architectural, experienced on reinforced concrete and steel building. Electrical, familiar with lighting and power layouts. Pipe, able to lay out service and hot water piping. Mechanical, general experience. Salaries in accordance with ability. Location, Conn. R-2285.

DRAFTSMAN with knowledge of ordinary mechanical drafting such as is needed in the designing of new plants for chemical processes. Good future. Location Hastings-on-Hudson, N. Y. R-2286.

EDITORIAL WRITER for technical research and development work. Must have a technical degree and several years of experience in editorial work on trade papers, and in general engineering work. Man between 28 and 35 years of age desired. Salary, about $3000 per year. Application must be made through a commercial employment agency, which charges a placement fee. R-2287.

INSTRUCTOR IN ELECTRICAL ENGINEERING in a Western University. Two years' practical experience desirable; can begin duties at once. R-2288.

ENGINEER for technical publication work; must have had editorial and report writing experience. Refrigeration experience also desirable. Location, Middle West. R-2290.

TECHNICALLY TRAINED ENGINEER wanted to conduct test work on custom ores. Applicant should have a good understanding of concentration in general with special reference to oil flotation. Desirable that applicant be conversant with analytical work in order that he may supervise chemical as well as experimental work. Situation in eastern part of country. Advise salary desired, when available, and give full details of past experience, together with list of references. R-2292.

RECENT GRADUATES in mechanical engineering for testing work. Two openings. Salary, about $200 per month. Location, Chicago. R-2291.

SALES MANAGER to take charge of the New York Office of a company manufacturing concrete machinery. Will have to develop new business. Only those who have established reputation for such accomplishment will be considered. R-2293.

CHIEF OF PARTY for permanent position in Jamaica, Long Island. R-2294.

SALES ENGINEER to sell technical books. Salary, $50 per week. R-2295.

YOUNG ENGINEER with a minimum of two years' experience in oil burning equipment in connection with steam power plants. Location, New York City. R-2296.

CHEMICAL, ELECTRICAL AND MECHANICAL ENGINEERS, recent graduates, for work in lamp development laboratory. Openings for 8 or 10 men. Location, New Jersey. R-2297.

CHEMIST, preferably one with several years of practical experience after graduation from college along the lines of general steel mill analysis. Should have ability and initiative to assume the position of chief chemist of laboratory in the near future. Location, Philadelphia, Pa. R-2298.

SALES ENGINEER to sell sugar centrifugals in Cuba and throughout the West Indies, man with a speaking knowledge of Spanish preferred. R-2299.

TRANSLATOR, electrical engineer preferred, who can rewrite French technical information into English. One who has received his education in France would naturally be preferred, but it is not essential. Location, New York State. R-2300.

YOUNG ELECTRICAL ENGINEER with industrial experience and some teaching ability for a teaching position that will pay from eighteen to twenty-one hundred dollars at the start; should be the kind of man who can get along with boys and influence them properly. Location, St. Louis, Mo. R-2301.

RESEARCH ASSISTANT for University Engineering Experiment Station. Graduate study in Electrical Engineering, or experience in research, essential. Location, Illinois. R-2302.

MACHINIST FOREMAN for medium-sized manufacturing and repair shop. Location, Perth Amboy, N. J. R-2304.

MECHANICAL OR ELECTRICAL DRAFTSMAN for electrical heating appliances. Location, New York City. R-2305.

MECHANICAL ENGINEER under 30 years of age, with experience in the oil business. Location, New York City. R-2306.

SUPERINTENDENT FOR SHOP, including Iron Foundry, with 300 employees, making Air Compressors, Rock Drills, Pneumatic Tools, and allied lines. Location, Province Quebec, Canada. R-2307.

ENGINEER for design and development of Mining Machinery. Location, Province Quebec, Canada. R-2308.

DRAFTSMAN familiar with industrial plant work, consisting of piping, transmission and construction work. Location, New York City. R-2309.

INSTRUCTOR IN MECHANICS at a Middle Western University for next semester, beginning about February 10. Salary will depend on qualifications; maximum, $1900 for academic year. R-2310.

ASSISTANT IN ENGINEERING AND SALES OFFICE: young man, recent technical graduate in mechanical engineering. Location, Providence, R. I. R-2311.

MECHANICAL DRAFTSMAN: experience on stationary and marine engines and general machinery preferred. Location, Providence, R. I. Permanent position for right man. R-2312.

MECHANICAL LABORATORY INSTRUCTOR; must be able to teach Kinematics. Salary, $1300-$1500. Location, Maine. R-2313.

BRIDGE ENGINEER: Extensive experience in steel and reinforced-concrete structures and designing and constructing ability. Good opportunity for increasing responsibility and salary. Government position. Location, Montana. Salary, $250 per month to start. R-2025.

MECHANICAL DRAFTSMEN: Should have served apprenticeship in blueprinting and tracing; 2 to 6 years' experience in actual detail and layout work. Working knowledge of machine designs and design of small parts. Age, 26 to 40 years, married men preferred; physical condition and eyesight must be excellent. Duties consist of general detail design and layout work in drafting room on machines used in articles produced in manufacture of kodaks and films. Several openings. Application by letter; giving list of places formerly employed together with names of employer. Location, Rochester, N. Y. Salary, $50 to $60 per week, depending upon experience and ability. R-2041.

ARCHITECTURAL DRAFTSMEN, with advanced experience, are required for this work. Should be conversant with details of buildings, layout and construction and requirements in New York State. Must be able to plan and do independent work. Duties will consist of planning of buildings, laying out floor plans, designing elevations, etc. Age, 26 to 40 years; married men preferred; physical condition and eyesight must be excellent. Several openings. Applicant should give list of places formerly employed, and names of employer. Location, Rochester, N. Y. Salary, $50 to $60 per week for high-grade men. R-2042.

DESIGNER: Large rubber manufacturing company located in New York City desires first-class tool and machine designer. Candidates should have at least four years' experience in designing of automatic machinery and tools for interchangeable quantity production. Only men thoroughly competent will be considered. Excellent permanent position open. In applying state age, education in detail, experience and salary desired. Location, New York City. R-2061.

SALES ENGINEER: Leading firm of power-plant specialties manufacturers has promising opening for young engineer to act as assistant to district manager. Require good general and some technical education, high character and will to succeed. Practical knowledge of power-plant design or operation an advantage. Previous selling experience not absolutely necessary. Position pays a small salary to start, but has unlimited possibilities for right man to develop from sales engineer to branch manager. Location, New York City. R-2062.

MEN AVAILABLE

Only members of the Society are listed in the published notices of this section. Copy for notices should be on hand by the 12th of the month, and the form of notice should be such that the initial words indicate the classification. Notices are not repeated in consecutive issues.

MECHANICAL CHEMICAL SALES ENGINEER: technical graduate; extensive experience in by-product coke-oven layout, apparatus design and operation, power-plant heating and ventilating, and sales work; desires connection with company manufacturing engineering specialties, temperature-controlling devices, etc., or chemical by-products. Would not object to some design work in connection with sales. Age 32. A-2987.

POWER SPECIALIST; technical graduate; age 32, married. Ten years' experience in power-plant construction, operation and management. Two years' experience with gas engines and producers. Desires position with industrial concern in charge of steam and power generation and utilization. Employed, but available within two months. Minimum salary, $300. A-3451.

CONSULTING ENGINEER, with extensive experience on interchangeable non-ferrous and ferrous metallic products, both as to standardization of manufacturing processes and scientific management. Knowledge of French language and industrial conditions. A-4417.

ENGAGEMENT WANTED AS CHIEF DRAFTSMAN OR CHIEF ENGINEER on industrial-plant construction extension or maintenance. Experienced in several branches of engineering, budget systems and unit-cost keeping. Good executive; 18 years' practical experience. Can secure skilled technical assistants. Excellent record. Many references. A-4509.

FACTORY EXECUTIVE seeks greater responsibilities as works engineer or assistant; 18 years' comprehensive designing, engineering and production experience, principally on steam-power machinery, including turbines; plant layout; equipment; standardization of product; and methods for coördinating and efficiently controlling various functions of plant operation. Age 36. A-4617.

ENGINEER EXECUTIVE; ability to devise simple methods of manufacturing high-class products; desires position as superintendent or equipment engineer. Experience; printing machinery, ball bearings, incandescent-lamp machinery and small arms. Location, New York City or New Jersey. A-4847.

CONTRACTORS ENGINEER; experienced in heavy-construction work; 12 years on subway construction, 3 years as supervising engineer on industrial buildings for contractor; capable of estimating, purchasing materials and closing contracts; wants position where executive ability is essential. Technical graduate. A-4919.

SALES ENGINEER for Philadelphia territory; age 29; technical graduate; broad experience; at present in partnership with consulting engineer handling general management and getting of business. Wide personal and business acquaintance. Salary or commission. A-5160.

WORKS ENGINEER; age 25; technical graduate; as engineer and draftsman in construction of machine tools, steam engines, lumber machinery and railroads; position must require plenty of hard work, be permanent and have good opportunities for advancement. Married. Employed at present. A-5161.

MECHANICAL ENGINEER OR POWER SUPERINTENDENT; technical graduate with 16 years' experience in design, construction and operation of central-power stations wishes position in similar line or as industrial-plant manager. A-5162.

MECHANICAL OR SALES ENGINEER for service in Japan, China or Siberia; have had 17 years' experience in Far East in contracting for and installing industrial plants, in manufacturing and in consulting work; desires engagement as representative of large American manufacturing company. A-5163.

ENGINEER AND DRAFTSMAN; married; 15 years' practical experience in steel mining and general industrial-plant engineering; present position chief draftsman for large steel and coal company; desires change of engineering nature, but not necessarily in drafting room. A-5164.

INDUSTRIAL ENGINEER; college graduate, 35 years of age; successfully handled labor and organization problems and installed effective methods of material and production control in several plants. Experienced in industrial investigations, factory layouts and standardization work. A-5165.

ELECTRICAL AND RADIO ENGINEER; university graduate; age 26; married. Four years' experience in plant layout and in design of electrical and radio apparatus. Desires position as designer or supervising draftsman with large concern where opportunities are offered for advancement. Only responsible and permanent position will be considered. Minimum salary, $2800. A-5184.

DESIGNER; age 32; fourteen years in machine shop and drawing room; technical education and ability to apply it; can handle drawing room on special machinery, experimental and development work. A-5183.

MINING ENGINEER; married; age 42 years; 20 years' experience mining and metallurgy in States, Mexico and Central America; speaks French and Spanish; late superintendent large low-grade gold property, California. Open for engagement, preferably South America. A-2425.

ASSISTANT TO GENERAL MANAGER, OR PLANNING ENGINEER. At present employed as head of cost and production departments of well-known machinery company. Seven years' experience, covering wide range of manufacturing in various executive positions; lowest salary to start, $5000 per year. A-3243.

MECHANICAL ENGINEER; graduate M. I. T. 1917; two years' engineering experience as draftsman and assistant to superintendent; desires position as assistant to engineer or superintendent with manufacturing concern. A-3249.

SUPERINTENDENT OR EXECUTIVE ENGINEER; technical graduate; 18 years' general engineering and practical experience in large industrial plants, as power-efficiency engineer, superintendent of power plant, works engineer and mechanical superintendent. Thoroughly familiar with plant organization, general accounting and business methods as applied to industrial-plant operations. A-4651.

EXECUTIVE ENGINEER; age 25; open for engagement with progressive organization. Has had exceptional experience in mathematical designing, drafting, production and order departments, estimation of raw material requirements, power-plant tests, maintenance, plant-efficiency, general accounting and business methods. Location, East. Salary, $4000 a year. A-839.

YOUNG ENGINEER, American, age 24, desires position in technical or commercial capacity; experience comprises two years' shop production and drafting. Location, United States or abroad. A-1739.

INDUSTRIAL ENGINEER; experience includes design, construction, organization and operation of industrial plants, also selling such services. Has held positions as assistant general manager and works manager. In Ordnance Department was head of branch of inspection detailed in Washington. Later, was assistant district inspection manager, assistant district chief and chairman of District Salvage Board, and as chairman of latter, organized forces and planned for inventories, sales and storage of Government property. A-4289.

MECHANICAL ENGINEER; age 38; last four years manager sulphuric-acid plant; desires connection in Philadelphia or vicinity. Technical graduate. Other experience in water works, fertilizer factories, coal mines, shops and cement plants as designer and superintendent of construction. A-4698.

EXPERIMENTAL OR RESEARCH ENGINEER in automotive industry; 2 years as engineer of tests in charge of physical tests, heat treatment experiments, pyrometers, etc.; 1½ years on efficiency work; and 1 year in charge of heat-treatment and inspection of seamless-steel cylinders. Technical graduate; age 25. A-5234.

POWER-PLANT ENGINEER; technical graduate; age 35; married; 10 years' experience as chief engineer and superintendent of design, construction, operation, and maintenance of power plants; heating and ventilation, and refrigeration in large institutions; available for similar work, or general designing with manufacturer or consulting-engineering firm. Salary, $3600. A-5235.

SALES ENGINEER; technical graduate; married; age 30; 3½ years' factory experience as assistant engineer in large refinery; 2 years' purchasing and selling of machinery with export company; 1½ years Captain U. S. A. purchasing ordnance equipment and in charge of utilities. Now employed. Location, New York or vicinity. A-5236.

ASSISTANT PRODUCTION ENGINEER; technical graduate in industrial engineering; age 24; over 2 years' excellent experience as assistant mechanical engineer in plant employing 10,000; desires to get into production work, for which he feels best suited and most interested. Not afraid of responsibility or work. Minimum salary, $2400. A-5237.

ASSISTANT TO PLANT SUPERINTENDENT; technical graduate; age 30; 6 years' experience in belt and special duty conveyor industry, as production man, estimator, and engineer supervising design, and purchase of equipment, and materials; also experienced in estimating building material and equipment. New England preferred, but New York or Middle Western location considered. A-5218.

SUPERINTENDENT OR WORKS MANAGER with 20 years' versatile experience in construction, equipment maintenance, quantity production, development and interchangeable manufacture. Expert practical mechanic and graduate mechanical engineer. Connection with stable concern desired. Remuneration commensurate with responsibilities. A-3542.

ASSISTANT TO CHIEF ENGINEER, EXECUTIVE OR SALES. Harvard graduate, age 30; married; 9 years' engineering and executive experience, hoisting, conveying, power transmission, and coal-handling apparatus. A-3245.

RECENT GRADUATE desires position in factory in minor executive capacity. Desires to learn the management, etc., of factory; hence salary is no object. Factory must be in New York City or immediate vicinity. Has had one year's experience as assistant to manager in California lumber mill. A-5179.

COLUMBIA GRADUATE; age 27; single; desires opportunity with an efficiency or industrial engineer, or as assistant works manager. Has had four years of varied experience on construction work; in charge of electrical and mechanical equipment and in all departments of large electric-light and power company. A-247.

GRADUATE MECHANICAL ENGINEER; 17 years' experience in construction and commercial work; recently released from army; desires connection with progressive company in executive capacity; or, to represent company as sales agent in New York City. American, married, age 40. A-5231.

SUPERINTENDENT OR PRODUCTION ENGINEER; technical graduate; 16 years' experience, covering layout and operation of power plants, steel-mill, machine shop, foundry and airplane work; ability to plan and rout work, develop equipment, handle men and produce results in wood or metal. Now employed. A-1868.

MANUFACTURING ENGINEER; 9 years' experience in machinery manufacturing industries. Knowledge of design, plant operation and management, shop-cost accounting, production systems, appraisals, graphic analysis, etc. Desires position within 100-mile radius of New York or in New England. At present employed. Age 31; married. A-5261.

SHIPYARD MANAGER OR CHIEF ENGINEER; 20 years' experience on ships and shipbuilding; 5 years in executive position controlling up to 2500 men; thorough theoretical and practical knowledge of ship and propelling machinery, construction and repairs. Will be disengaged shortly. Desires position of responsibility. A-5262.

SAFETY ENGINEER; graduate textile engineer recently discharged from service as Captain, Coast Artillery. One year teaching experience and 3 years as safety inspector. Location, East; New England preferred. A-5174.

CANDIDATES FOR MEMBERSHIP

TO BE VOTED ON AFTER JANUARY 10, 1920

BELOW is a list of candidates who have filed applications since the date of the last issue of MECHANICAL ENGINEERING. These are arranged geographically. Applications for change of grading are also posted. The total number of applications received and listed below is 180.

The Membership Committee, and in turn the Council, urge the members to scrutinize this list with care and advise the Secretary promptly of any objections to the candidates posted. All correspondence in this regard is strictly confidential. Unless objection is made to any of the candidates by January 10, 1920, and provided satisfactory replies have been received from the required number of references, they will be balloted upon by the Council.

NEW APPLICATIONS

Alabama

BECKLEY, LEROY W., Chief Draftsman, American Steel & Wire Co., Fairfield
REINERT, GEORGE L., Assistant Chief Draftsman, American Steel & Wire Co., Fairfield

Arkansas

PHILLIPS, P. T., Chief Engineer, Power Equipment Co., Little Rock

California

POTTS, WILLIAM K., Mechanical Draftsman, State Department of Engineering, Sacramento
VOELKER, ALBERT A., Mechanical Engineer and Draftsman, American Beet Sugar Co., Oxnard

Colorado

BURLINGAME, CHARLES R., Instructor in Mechanical Engineering, University of Colorado, Boulder
CROFT, HUBER O., Estimator, Stearns Rogers Mfg. Co., Denver
NEWBURY, ROBERT C., Engineer, Denver Gas & Electric Light Co., Denver

Connecticut

CLEARY, JAMES F., Machine Designer and Draftsman, Lake Torpedo Boat Co., Bridgeport
DUNN, ALBERT L., Tool Designer, Bullard Machine Tool Co., Bridgeport
HERZOG, RALPH W., Tool Equipment and Process Engineer, Winchester Repeating Arms Co., New Haven
PLATT, FRANK L., Mechanical Draftsman, Lake Torpedo Boat Co., Bridgeport
RAYMOND, RAYMOND P., Engineer, Columbia Graphophone Mfg. Co., Bridgeport
SBURLINO, PASCAL, Supervisor of Drafting, Columbia Graphophone Co., Bridgeport
YOUNG, WILLIAM R., Experimentalist, Columbia Graphophone Co., Bridgeport

Delaware

REIMER, FRANK H., Inspector, Bethlehem Shipbuilding Corp., Wilmington
STUNZI, JEAN J., Plant Study Engineer, E. I. du Pont de Nemours & Co., Wilmington

District of Columbia

McMANAMY, FRANK, Assistant Director, U. S. Railroad Administration, Washington
NORTON, WILLIAM T., JR., Assistant Chief Engineering Branch, Motor Transport Corps, Washington
PFAHLER, FREDERICK P., Chief Mechanical Engineer, U. S. Railroad Administration, Washington

Illinois

BUYERS, DONALD E., Efficiency Engineer, International Harvester Co., Rock Falls
COOBAN, FRANK G., Sales Engineer, Gutta-Percha & Rubber Mfg. Co., Chicago
CROSS, HAROLD W., Sales Engineer, General Electric Co., Chicago
GREENLEE, WILLIAM B., Vice President and Treasurer, Greenlee Brass Co., Chicago
MAURER, CLAUDE N., 1st Lieut. Engineers, U. S. A., Woodstock
MERRIMAN, MERLE E., Staff Engineer, L. V. Estes, Inc., Chicago
O'CONNOR, JOHN F., Mechanical Engineer, W. H. Miner, Chicago
PLATE, HENRY D., Chief Draftsman, H. Mueller Mfg. Co., Decatur
ROGERS, HOWARD H., Treasurer, Williams, White & Co., Moline

Indiana

HOUGHTON, CARL R., Chief Draftsman, Connersville Blower Co., Connersville

Kansas

BELL, ALEXANDER H., Consulting Engineer, Empire Gas & Fuel Co., El Dorado
JONES, FORREST E., Assistant Superintendent Construction, Empire Gas & Fuel Co., El Dorado

Kentucky

WOLF, JULIUS, Assistant Professor of Steam Engineering, University of Kentucky, Lexington

Louisiana

MOODY, HOWARD N., Contractor, New Orleans

Maryland

CALDER, HORACE W., Assistant General Sales Manager, Poole Engineering & Machine Co., Baltimore
COCHRANE, WILLIAM F., Chief Engineer, U. S. Industrial Alcohol Co. and Subsidiaries, So. Baltimore
HARTLOVE, WALTER E., Machinery Inspector, United States Shipping Board, Emergency Fleet Corp., Baltimore
MUELLER, MAX W., Mechanical Engineer, Tungsten Products Co., Baltimore

Massachusetts

AVERY, LEON J., Assistant Master Mechanic, Saco-Lowell Shops, Lowell
BENSON, HARRY F., Mechanical Engineer, Worthington Pump & Machinery Co., Holyoke
BLACKBURN, FELIX, Chief Draftsman, Cowan Truck Co., Holyoke
CROWLEY, CHARLES P., Mechanical Draftsman, Stone & Webster, Boston
DINGMAN, CHARLES F., Engineer, Flynt Building & Construction Co., Palmer
HODGDON, DONALD F., Charlestown
MARTIN, CHARLES H., President, Martin Rocking Fifth Wheel Co., Springfield
FIELD, MALCOLM F., Engineer Supervisor, U. S. Armory, Springfield
McBRIDE, WILLIAM J., Engineer, General Electric Co., Lynn
PIKE, LORENZO H., Factory Manager, Hygrade Lamp Co., Salem
RYAN, JAMES H., Mechanical Superintendent, Phelps Publishing Co., West Springfield
STEARNS, FREDERICK A., Instructor, Mechanical Engineer Department, Massachusetts Institute of Technology, Cambridge
SULLIVAN, EDWARD L., Combustion Engineer, Cochrane Harper & Co., Boston
WILLIS, CHARLES C., Department Head, Dennison Mfg. Co., Framingham
WOSTREL, JOHN F., Mechanical Engineer, Boston Belting Corp., Boston
WYSE, FRANCIS O., Assistant Engineer, The Planchard Machine Co., Cambridge
ZWISLER, PERRY F., Assistant Superintendent of Equipment, Springfield Armory, Springfield

Michigan

FISHER, BOYD, Supervisor of Personnel, Aluminum Castings Co., Detroit
NICHOL, ALFRED H., Service Engineer, Diamond Power Specialty Co., Detroit
RABEZZANA, HECTOR, Experimental Engineer, Champion Ignition Co., Flint
SASS, HARVEY M., Mechanical Engineer, Leitelt Iron Works, Grand Rapids
SPENCE, PAULSEN, Sales Engineer, Crane Co., Detroit

Minnesota

WRIGHT, CHARLES R., Designer, Minneapolis Steel Co., Minneapolis

Missouri

STOWE, LOYD R., Manager, Stoker Department, Laclede Christy Clay Products Co., St. Louis
PETERS, JOSEPH W., Manager, Specialties Department, Reeves & Skinner Machinery Co., St. Louis
WEBER, RUDOLPH L., Engineer of Equipment and Power, Board of Control, Kansas City Railways Co., Kansas City

Nebraska

SAXON, REUBEN B., Production Department, Hebb Motors Co., Havelock

New Jersey

AWOT, ADOLPH W., Draftsman, International Arms & Fuze Co., Bloomfield
GRIFFITH, JAMES E., Safety Engineer, E. I. du Pont de Nemours & Co., Carney's Point
HAMILTON, GEORGE G., Chief Engineer, National Hoist Engine Co., Harrison
HERNDON, PARRISH T., Fuel Oil Expert, Standard Oil Co., Elizabeth
MORRIS, DWIGHT B., Assistant Engineer, E. I. du Pont Co., Carney's Point
POTTER, CARL H., Superintendent, Brighton Mills, Passaic
PRATT, EVERARD S., Employment Manager, The Celluloid Co., Newark
RAMSEY, CLIFFORD H., President, Morrison Machine Co., Paterson
THOENE, FRED A., Assistant Superintendent of Power, Graselli Chemical Co., Graselli
WEINER, CHARLES M., JR., Draftsman, Ingersoll Rand Co., Phillipsburg
WICKERS, ARTHUR L., Mechanical Engineer, The Laurel Co., Garfield
WRIGHT, DANIEL K., Engineering Department, General Electric Co., Harrison

New York

BATESOLE, DWIGHT E., Mechanical Engineer, The Norma Co. of America, New York
BURNS, ALAN E., Sales Engineer, Casey Hedges Boiler Co., New York
CALDER, ALEXANDER, Draftsman, New York Edison Co., New York
CASTRO-GAMBOA, FRANCISCO, Editorial Staff, International Engineering, McGraw Hill Co., New York (Re-election)
CLARK, WALTER J., Assistant Engineer, American Sugar Refining Co., Brooklyn
CLARK, WATSON G., Consulting Engineer, New York
CONROY, JOHN I., New York Manager, Malm Engineering Co., New York
COX, THOMAS R., Consulting Engineer, Dodge & Seymour, New York
DASSY, CHESTER F., Chief Machinist Mate, U. S. Navy, New York
FORGO, G. ERWIN, Assistant to Sales Manager, Fiske Bros Refining Co., New York
HARVIE, KING A., Assistant Manager, Ford, Bacon & Davis, New York
HECKMAN, JAMES C., Consulting Engineer, Larkin Co., Buffalo
KNOWLES, HARVEY C., Supervising Engineer, American Chicle Co., Long Island City
LANGTON, JOHN, Consulting Engineer, New York
OBLER, DAVID M., Production Engineer, National Conduit & Cable Co., Hastings-on-Hudson
ROCKWELL, JOHN H., Lieut. U. S. S. "Delaware," New York
SCOTT, HERBERT VAN W., Appraisal Engineer, Ford, Bacon & Davis, New York
WARD, WILLIAM D., Manager, Atlantic Department, Pelton Water Wheel Co., New York
WATERMAN, DONALD F., Mechanical Designer, Brewster & Co., Long Island City
WHEELER, DUDLEY I., District Manager, Morse Chain Co., Ithaca
WURGEL, RENE A., Inspecting Engineer, Foamite Firefoam Co., New York

Ohio

BRUSSTAR, JAMES S., Assistant Mechanical Engineer, Cleveland Brass & Copper Mills, Cleveland
BRUCK, ALBERT G., Tool Designer, Cincinnati Milling Machine Co., Cincinnati
COCHRAN, ETHELBERT Z., Machine Tool Designer and Squad Leader, Niles Tool Works Co., Hamilton
CULLEN, EDWARD J., Chief Draftsman, Bailey Meter Co., Cleveland
DAVIS, OSCAR A., Chief Engineer, The Reeves Bros. Co., Alliance
DEEDS, DEAN D., Sales Manager, The Thew Automatic Shovel Co., Lorain
DEWEY, HARRY E., Salesman, Smith Gas Engineering Co., Dayton
EMERSON, MILTON, Inventory & Appraisal Staff, U. S. Ordnance, Cincinnati
GILLAM, WALLACE R., Mechanical Engineer, Wellman-Seaver-Morgan Co., Akron
GLAUCH, EDMUND S., Designer, Hooven Owens, Rentschler Co., Hamilton
GLEW, JAMES S., Assistant to General Manager, Bock Pearing Co., Toledo
GOLDRICK, ALBERT R., Manager, American Container Co., Cleveland
HARKENS, HENRY D., Designing Engineer, Youngstown Sheet & Tube Co., Youngstown
HARTMAN, GEORGE H., Squad Leader Die Design, Willys Overland Co., Toledo
HAYWARD, HENRY W., Engineer, Henry L. Doherty & Co., Toledo
THOMPSON, STEPHEN G., Chief Transportation Engineer, The White Co., Cleveland
QUEISSER, CHARLES F., General Superintendent, Electric Vacuum Cleaner Co., Cleveland

Oklahoma

DEBARR, EDWIN, Head of Department of Chemistry & Director School of Engineering, University of Oklahoma, Norman
RINEHART, ALFRED W., JR., Assistant Engineer, Lee C. Moore & Co., Tulsa

Pennsylvania

BECKER, HARRY N., Draftsman, Barrett Co., Philadelphia
COMFORT, GEORGE B., Assistant Works Manager, Miller Lock Co., Philadelphia
DOWNS, SYDNEY F., Fuel Department, Lehigh Coal & Navigation Co., Lansford
FINE, LEWIS, Chief Engineer, Budd Wheel Corp., Philadelphia
FRITSCH, ROBERT E., Assistant Engineer & Private Secretary, E. E. Brownell Engineering Co., Philadelphia
HARRISON, THOMAS L., Engineer, E. I. du Pont de Nemours & Co., Philadelphia
HOOPES, PENROSE R., Designer, Stokes & Smith Co., Philadelphia
KRATZ, RAYMOND C., Engineer, Day & Zimmerman, Inc., Philadelphia
MASCHE, ALBERT C., Sales Engineer and Estimator, Ehret Magnesia Mfg. Co., Philadelphia
NEUBER, GEORGE H., Instructor, Spring Garden Institute, Philadelphia
PAGE, ARVIN, Investigator in Research Department, New Jersey Zinc Co., Palmerton
ROSE, HAROLD MCN., Assistant Secretary, Pennsylvania Bituminous Mutual Asso., Huntingdon
SCHWARTZ, WALTER M., Vice-President and General Manager, Philadelphia Textile Machinery Co., Philadelphia
SINGLETON, PALMER C., Experimental Engineer, Pethlehem Steel Co., Bethlehem
WATSON, HAROLD F., Engineer, Link-Belt Co., Philadelphia
WRIGHT, THOMAS C., Representative, Standard Steel & Bearings, Inc., Philadelphia

Rhode Island

BATCHELDER, NELSON A., General Manager, B. B. & R. Knight, Inc., Providence

Texas

GODBOLD, LOUIS A., Chief Draftsman, Hughes Tool Co., Houston
TIPTON, WARREN A., Refinery Engineer, Durable Manufacturing Co., Dallas

Utah

CANNON, WILFORD Y., Assistant Consulting Engineer, Utah-Idaho Sugar Co., Salt Lake City

Virginia

LOVETTE, STANISLAUS A., Checker, N. & W. Railway Co., Roanoke

Wisconsin

ANDERSON, FRITZ A., Engineer and Superintendent, Burdick Cabinet Co., Milton
FRARY, HOBART D., Assistant Professor of Steam and Gas Engineering, University of Wisconsin, Madison

Australia

BRAGG, JAMES W., Governing Director, Gibson Battle & Co., Ltd., Sydney

Canada

COMBE, FRANK A., Chief Engineer for Canada, Babcock & Wilcox, Ltd., Montreal
WATSON, MCCLELLAND B., Director of Engineering, Central Technical School, Toronto

Dominican Republic

MULET, LORENZO M., Manager, Sucesores de Abarca, Santo Domingo

England

WANS, OSWALD, Chief of Internal Combustion Engine Department, Messrs. Ruston & Hornsby, Ltd., Lincoln

India

RAM SAMI, SOORFA N., Manager, Sandal Oil Factory, Bangalore

Japan

ABE, KEIICHI, Mechanical Engineer, Mitsubishi Zosen Kaisha, Ltd., Tokyo

Philippine Islands

FELICIANO, INDALECIO, Assistant Mechanical Superintendent, Manila Railroad Co., Caloocan, Rizal

CHANGE OF GRADING
PROMOTION FROM ASSOCIATE

Connecticut

REEVES, EDWARD H., Scientific Assstant, United States Public Health Service, New Haven

New York

CLOCK, ERNEST E., Chief Inspector, Fidelity & Casualty Co., New York
TAYLOR, WYATT W., Assistant Chief Engineer, American Can Co., New York

PROMOTION FROM ASSOCIATE-MEMBER

Illinois

STARK, JULIAN E., Chief Draftsman, Crane Co., Chicago

Massachusetts

SCHOOF, ARTHUR W., Gage Engineer, Greenfield Tap & Die Corp., Greenfield

Missouri

BRYAN, WALTER E., Superintendent Power Stations, United Railway Co., St. Louis

New York

BROWN, JAMES S., Mechanical Engineer, N. Y. District Claims Board, U. S. Ordnance Department, New York

Pennsylvania

COOPER, DAVID M., Mechanical Engineer & Draftsman, National Metal Molding Co., Ambridge
SCHULZ, GUSTAVE E., Organizer, H. K. Hathaway, Philadelphia
TALIAFERRO, R. RYLAND, Sales Engineer, Carrier Engineering Corp., Philadelphia
VEENSCHOTEN, VINCENT V., Northern Equipment Co., Erie

Rhode Island

FISHER, HOWARD C., General Manager, Central Construction Co., Saylesville

South Africa

WEAVER, WILLIAM G., Lecturer on Mechanical Engineering, University of Cape Town, Cape Town

PROMOTION FROM JUNIOR

Illinois

LEVALLY, JOHN R., Sales Engineer, Locomotive Superheater Co., Chicago

Kansas

SWIGGETT, CLAYTON A., Superintendent, Lehigh Portland Cement Co., Iola

Massachusetts

DEAN, DION K., District Sales Manager, Alberger Pump & Condenser Co., Boston
NEWMAN, WILLIAM C., General Electric Co., Lynn

Michigan

BAIRD, LYMAN S., Production Manager, Sunnyhome Electric Co., Detroit
BROCK, CLARENCE A., Draftsman, Ford Motor Co., Highland Park

New York

CHUTE, STANLEY J., Engineer, The Griscom-Russell Co., New York
EDWARDS, HAROLD H., Engineer, Construction Department, Swift & Co., New York
HUTCHINS, HARRY C., Engineer, Richmond Levering & Co., New York (Reinstatement)
LAWRENCE, JOHN H., Assistant Mechanical Engineer, The New York Edison Co., New York
MAUGER, DAVID N., Assistant to Vice President, The Babcock & Wilcox Co., New York

Ohio

NORRIS, DONALD G., Assistant Superintendent, The Hart Manufacturing Co., Cleveland
SHAFFER, LAYTON S., Chief Engineer, Ohio Locomotive Crane Co., Bucyrus

Oregon

GRAF, SAMUEL H., Professor of Experimental Engineering, Oregon State Agricultural College, Corvallis

Pennsylvania

FISLER, A. CARL, Draftsman, U. S. Shipping Board Emergency Fleet Corp., Philadelphia
MULHERON, WILLIAM, Assistant Chief Engineer, Merchant Shipbuilding Co p., Chester
SWAIN, PHILIP W., Mechanical Engineer, The Franklin Manufacturing Co., Franklin

Vermont

KEATOR, SIMON P., Office Manager, Vermont Farm Machine Co., Bellows Falls

Cuba

TURNER, WILLIAM C., Southern Sales Corp., Havana

SUMMARY SHOWING AVERAGE AGE AND POSITIONS OF APPLICANTS ON BALLOT CLOSING NOVEMBER 19, 1919

Average age of applicants

Members	37
Associates	40
Associate-Members	32
Juniors	24

Calculator	1
Chief Engineers	10
Combustion Engineer	1
Construction Engineers	2
Designers	8
Draftsmen	7
Chief Draftsmen	3
Efficiency Engineer	1
Executives (Pres., V. Pres., Secy., Treas., Mgrs.)	18
Foremen	3
Industrial Engineers	3
Inspector	1
Instructors	3
Master Mechanics	2
Mechanical Engineers	19
Asst. Mechanical Engineers	4
Production Engineers	2
Safety Engineers	2
Sales Engineers	6
Sales Managers	2
Superintendents	7
Asst. Superintendents	4
Supervisors	2
Works Engineers	3
Miscellaneous	32

UNITED STATES GOVERNMENT SERVICE

Captain	2
1st Lieut.	2
Ensign	2

SUMMARY

New Applications	148
Applications for change of grading	
Promotion from Associate	3
Promotion from Associate-Member	10
Promotion from Junior	19
Total	180

ANNUAL REPORTS OF COMMITTEES

THE Annual Reports of the Standing Committees of the Society on Finance, Meetings and Program, Membership, Publication and Papers, Local Sections, Constitution and By-Laws, Library, Research and Standardization, were all received by the Council at its meeting in Indianapolis, on October 24, and ordered printed and distributed to the membership prior to the Annual Meeting.

On account of the printing situation, it has been impossible to carry out the custom of printing these reports in MECHANICAL ENGINEERING, but sufficient copies were prepared by photographic process and distributed at the Annual Business Meeting on December 3. Any members desiring copies may obtain them on request.

The report of the Finance Committee, with the statement of accounts, is, however, being printed below, because it is felt that recommendations of appropriations and expenditures are always of sufficient importance to warrant distribution to the entire membership.

Report of Finance Committee

The Finance Committee reports that the income of the Society for the year ending September 30, 1919, was $332,942.46. After reserving $19,000 for obligations undertaken but not yet completed, the total expenditures chargeable to income were $330,855.50, leaving an excess of income over expenditures of $2,086.96.

Based on a membership of 10,200 (the average of the total membership on October 1, 1918, and that on October 1, 1919), the average income of the Society per member for the fiscal year just closed is tabulated below. The corresponding income for the preceding year is included for comparison.

AVERAGE INCOME PER MEMBER

	1917-1918	1918-1919
Membership Dues	$14.06	$13.56
Sales — Gross Receipts	1.61	3.12
Advertising	9.31	11.38
Interest and Discount	.50	.94
Initiation Fees	1.02[1]	3.64
	$26.50	$32.64

[1] Represents one-half income.

Based on the same average membership, the expenditures of the Society per member for the fiscal year just closed are also given below, together with the corresponding expenditures for the previous year for comparison.

AVERAGE EXPENDITURE PER MEMBER

	1917-1918	1918-1919
Meetings, Annual and Spring	$1.41	$1.45
Publications:		
Journal	$7.29	$8.78
Condensed Catalogues	2.19	2.42
Transactions	2.22	2.50
Year Book	.79	.96
Engineering Index Monthly	....	1.01
	$12.49	$15.67
Membership and Increase of Membership	$2.09	$1.48
Office Administration	3.00	3.94
Upkeep of Headquarters	.32	.69
Employment Bulletin	.33	.23
Government Employment Work	.20	....
Aims and Organization	....	.62
United Engineering Society:		
Assessment to U. E. S.	$0.55	$0.51
Library	.46	.45
Engineering Council	.42	.38
	$1.43	$1.34
Local Sections	1.59	1.97
Council, Contingencies, Mileage	.52	1.66
Student Branches	.07	.04
Cost of Sales (Publications, Pamphlets, etc.)	.99	1.69
Engineering Committees (Standardization, Research, Boiler Code, Power Test Code, etc.)	.93	1.36
Other Activities	.28	.29
TOTAL	$25.65	$32.43

The Budget Appropriation recommended by this committee for the year 1919-1920, and approved by the Council at Indianapolis on October 24, 1919, is as follows. The estimated income is $383,000.

RECOMMENDED EXPENDITURES FOR 1919-1920

Council and Contingencies	$10,000
Office Administration	40,000
Assessments	25,000
Meetings — General	15,700
Publications	177,600
Local Sections	23,000
Membership	6,700
Increase of Membership	9,500
Research	5,900
Professional Committees	10,000
House	3,500
Student Branches	1,500
Sales	21,000
Miscellaneous	500
Unexpected Current Expenditures (5 per cent of Income)	11,500
	$360,500
Appropriated to Reserve	22,500
	$383,000

The foregoing appropriations do not in all cases fully meet requests made by the different committees, but as the amount represents a very substantial increase over the appropriations one year ago (about $104,000), your Finance Committee feels that there should be no increased allowance at this time.

Following the budget's approval the committee can, and will be in a better position to recommend revisions either prior to, or at, the Council Meeting in December.

Appended are the reports of the accounts of the Society as shown in the books for the fiscal year ended September 30, 1919.

Respectfully submitted,

W. E. SYMONS, *Chairman*,
A. E. FORSTALL, *Vice-Chairman*,
ALEX DOW,
GEORGE M. FORREST,
FRANK E. LAW,
Finance Committee.

REPORT OF ACCOUNTANTS

FINANCE COMMITTEE,
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

DEAR SIRS:

In accordance with your instructions, we have examined the books and accounts of The American Society of Mechanical Engineers for the twelve months ended September 30, 1919.

The results of this examination are set forth in the three exhibits, attached hereto, as follows:

Exhibit A Balance Sheet, September 30, 1919.
Exhibit B Income and Expenses for the twelve months ended September 30, 1919.
Exhibit C Receipts and Disbursements for the twelve months ended September 30, 1919.

We certify that, in our opinion, the accompanying balance sheet is a true exhibit of its financial condition as of September 30, 1919, and that the attached statements of Income and Expenses, and Receipts and Disbursements, are correct.

Respectfully submitted,
(Signed) WM. J. STRUSS & CO.,
Certified Public Accountants.

EXHIBIT A

SEPTEMBER 30, 1919, BALANCE SHEET

ASSETS

Society's one-quarter Interest in the Building, Land and Real Estate Equipment (No. 25 to No. 33 West 39th Street)	$486,792.79

Library Books	$13,000.00	
Furniture and Fixtures	5,000.00	
		18,000.00
Stores, including plates and finished publications		29,307.11
Engineering Index		10,000.00
Trust Fund Investment:		
New York City 3½%, 1954 (par $45,000)	$39,696.81	
St. L., Peoria & N. W. 1st 5%, 1948 (par $10,000)	10,613.89	
United New Jersey Canal Co. (par $1,000)	970.00	
Cash in Banks representing Trust Funds	7,518.17	
		58,798.87
Liquid Assets:		
Liberty Bonds		55,000.00
United Engineering Society		10,000.00
Accounts Receivable:		
Members' Dues	15,008.10	
Initiation Fees	14,712.50	
Sales of Publications, Advertising, etc.	58,112.53	
		87,833.13
Advance Payments		4,573.98
Cash: In banks for general purposes	5,535.87	
Petty Cash Fund	1,500.00	
		7,035.87
		$767,341.75

LIABILITIES

Trust Funds:		
Life Membership Fund	$46,102.81	
Library Development Fund	4,902.71	
Week's Legacy Fund	1,957.00	
Melville Fund	1,127.36	
Hunt Memorial Fund	208.99	
Juniors' and Students' Prize Fund	2,000.00	
C. T. Main Award Fund	2,500.00	
		58,798.87
Dues paid in advance		2,241.06
Initiation Fees uncollected		14,712.50
Replacement Fund		1,163.18
Accounts Payable		5,244.12
Unappropriated Revenue	30,392.46	
Unexpended Appropriations — Excess	6,527.48	
		23,864.98
Capital Investment	$514,792.79	
Surplus and Reserve	146,524.25	
		661,317.04
		$767,341.75

EXHIBIT B

INCOME AND EXPENSES FOR THE TWELVE MONTHS ENDED SEPTEMBER 30, 1919

INCOME

Membership Dues	$138,334.58	
Sales — Gross Receipts	31,804.24	
Advertising	116,030.08	
Interest and Discount	9,643.56	
Initiation Fees	37,130.00	
TOTAL		$332,942.46

EXPENSES

Finance Committee:		
Office Administration	$40,160.82	
Occupancy Building	5,244.04	
Engineering Council	3,899.97	
Library	1,999.99	
Wages	2,625.01	
		$53,929.83
Membership Committee		5,846.89
Council:		
Contingencies	13,176.28	
Mileage	4,120.00	
Committee Miscellaneous	9,060.28	
Employment Bulletin	2,334.32	
		28,690.88
Increase of Membership Committee		9,212.45
House Committee		7,002.09
Section Committee		20,141.10
Meetings Committee		14,741.28
Publication Committee:		
Journal Text	$47,237.69	
Journal Advertising	39,925.36	
Journal Development	2,500.00	
Condensed Catalog	24,684.58	
Transactions and Revises	25,417.46	
Engineering Index	10,342.10	
Year Book	9,785.66	
		159,892.85
Aims and Organization Committee		6,323.64
Research Committee		4,416.64
Sales Expenditures		17,240.28
Hutton Memorial		2,500.00
Other Activities		917.57
TOTAL [1]		$330,855.50
		$2,086.96
Unexpended Appropriation, 1917-1918		2,778.02
Excess of Income over Expenses		$4,864.98

[1] The items of total expenses includes $19,000 not yet paid to complete work already in process and chargeable to this year's activities.

EXHIBIT C

RECEIPTS AND DISBURSEMENTS FOR THE TWELVE MONTHS ENDED SEPTEMBER 30, 1919

RECEIPTS

Membership Dues	$135,829.02	
Initiation Fees	36,670.00	
Membership Dues paid in advance	2,244.98	
Sales of Publications, Badges, Advertising, etc.	136,852.26	
Interest	7,683.08	
United Engineering Society	5,000.00	
City of East Orange Loan Certificate	21,371.95	
C. T. Main Award Fund	1,000.00	
	$346,651.29	
Cash on hand and in banks: General and Trust Funds, September 30, 1918	28,779.07	
		$375,430.36

DISBURSEMENTS

Disbursements for General Purposes	$325,876.32	
Liberty Bonds	25,000.00	
Engineering Index	10,000.00	
	$360,876.32	
Cash on hand and in banks: General and Trust Funds, September 30, 1919	14,554.04	
		375,430.36

A. S. M. E. YEAR BOOK—1920

Important! In order that changes of address may be incorporated in the 1920 Year Book, it is necessary that such changes be received at headquarters *not later than* January 2, 1920.

THE ENGINEERING INDEX

(*Reg. U. S. Pat. Off.*)

Published Monthly by The American Society of Mechanical Engineers

The Engineering Index was Founded in 1884 *by the Association of Engineering Societies; Published from* 1895 *to* 1919 *by The Engineering Magazine Company; and Acquired January* 1919 *by The American Society of Mechanical Engineers*

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THE following pages form a descriptive Index to articles on engineering and related subjects in current periodicals. In its preparation the Society's engineering staff regularly examines all of the technical journals and society publications received by the Engineering Societies Library, which form one of the greatest and most complete collections of scientific periodicals in the world, comprising upward of 1100 distinct publications in some ten languages. Cross-references are freely introduced in the Index, and in all cases where the titles of articles are not sufficiently descriptive, explanatory sentences are appended. The main abbreviations used in the items are given at the bottom of this page.

Mechanical Engineering

AIR MACHINERY

Air Compression

Some Elements of Economy in Air Compression, Wm. Carter. Can. Min. Jl., vol. 40, no. 43, Oct. 29, 1919, pp. 808-809. Observes that in steam-driven air compressors first element of economy lies in using compounded steam cylinders operating under pressures lower than would be advisable in ordinary engine practice.

Utilization of Exhaust Steam for the Direct Production of Compressed Air (Utilisation des vapeurs d'echappement pour la production directe de l'air comprimé), Auguste Dessemond. Bul. et Comptes Rendus Mensuels de la Société de l'Industrie Minérale, vol. 16, no. 3, 1919, pp. 5-32, 23 figs., partly on six supp. plates. Installations resembling scheme developed by Rateau, in which mixed turbine capable of operating with steam at low or high pressure is directly connected to multi-cellular compressor.

Air Compressors

Development of Reciprocating Air Compressors, S. T. Nelson. Eng & Min. Jl., vol. 108, no. 13, Sept. 27, 1919, pp. 533-536, 3 figs. It is said that machines of small capacity were formerly not expected to be efficient and that change from steam to electric drive resulted in many makeshift devices.

Air Pumps

The Marine Air Pump as a Power Factor, Harold C. Walker. Trans. Inst. Mar. Engrs., vol. 31, no. 246, Sept. 1919, pp. 341-358 and (discussion) pp. 358-362, 1 fig. Possibilities and performance of various types studied from vacuum point of view, together with notes on value of air pump efficiency as factor influencing turbine power.

Centrifugal Machinery

Centrifugal Ventilators and Centrifugal Pumps and their Drive (Die Zentrifugalventilatoren und Zentrifugalpumpen und ihre Antriebsmaschinen), V. Hüttig. Gesundheits-Ingenieur, vol. 42, nos. 14 and 15, Apr. 5 and 12, 1919, pp. 141-147 and 153-158, 11 figs. Calculating efficiency and power consumption under changed operating conditions. Suggestions for preventing humming noise and vibration of floor.

Experiments with Centrifugal Ventilators (Versuche an Sachsenwerk-Zentrifugal-Luftern), Hüttig. Gesundheits-Ingenieur, vol. 42, no. 24, June 14, 1919, pp. 241-252, 12 figs. Description of apparatus used for experiments; tables and curves showing results of tests.

Centrifugal Compressor Installation at Newport News Shipbuilding and Dry Dock Co., L. C. Loewenstein. Gen. Elec. Rev., vol. 22, no. 10, Oct. 1919, pp. 785-788. Turbo compressor is operated by exhaust steam from reciprocating engines and precompresses air delivered to reciprocating compressors. Output of compressor plant is said to have been increased in this way by about 50 per cent with very little additional expenditure for fuel, as reciprocating engines were operated non-condensing, a portion of steam being exhausted to air.

Governors

Volume Regulators for Air Compressors, C. S. Darling. Mech. World, vol. 66, no. 1711, Oct. 17, 1919, pp. 184-185. Comparative studies of various regulating systems.

Regulators, Volume

See Governors.

Wind Motors

Windmills. Times Eng. Supp., vol. 15, no. 540, Oct. 1919, p. 307. Their uses and limitations.

Windmills (Windmollen). Ingenieren, vol. 28, no. 63, Aug. 6 & 9, 1919, pp. 401-408 and 409-411, 11 figs. Formulæ for finding correct skew of sails, power developed by given wind velocity pressure on sails, and velocity of arms. Tables and coefficients offered with view to facilitate calculations. (Concl.)

CORROSION

Boilers and Economizers

Pitting and Corrosion in Boilers and Economizers, F. F. Vater. Power Plant Eng., vol. 23, no. 21, Nov. 1, 1919, pp. 963-964. Theories of corrosion causes, examples of pitting, effective preventives and cures.

Condenser Tubes

The Corrosion of Condenser Tubes, G. Costeceque. Eng. Rev., vol. 33, no. 3, Sept. 1919, pp. 60-61. Results of ten years' investigations of corrosion of surface condenser tubes by sea water. Translated from Revista de Obras Publicas.

Economizers

See Boilers and Economizers.

Floor Material

Steel-Plate Drip Floor for Niagara Railway Arch. Eng. News-Rec., vol. 83, no. 13, Sept. 25, 1919, pp. 620-621, 3 figs. Repairs necessitated by corrosion of floor-beams and stringers due to refrigerator drip and to locomotive blowoff.

FORGING

Die Pressings

The Manufacture of Die Pressings, J. H. Garnett. Machy. (Lond.), vol. 14, no. 362, Sept. 4, 1919, pp. 673-679, 20 figs. Describes advantages of and metals used for die pressings, as well as method for making dies.

Drop Forging

Drop-Stamping, Drop-Forging, etc.—IX, X, Joseph Horner. Mech. World, vol. 66 no. 1707 and 1711, Sept. 19 and Oct. 17, 1919, pp. 138 and 187, 21 figs. Sept. 19: Cast-iron or steel dies with hardened steel insertions. Oct. 17: Bevel-pinion blank.

Forging Temperatures

Forging Temperatures and Rate of Heating and Cooling of Large Ingots, F. E. Bash. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2869-2880, 3 figs. Test carried out on 24-in. round ingot. It was possible to heat ingot from room temperature to forging temperature in 7 hr. No definite conclusion is arrived at as to whether this heat would be injurious to steel, but it is advised that in any particular case question should be decided in light of shop experience.

Furnaces

A Recuperative Furnace for the Forge Shop, Blast Furnace & Steel Plant, vol. 7, no. 10, Oct. 1919, p. 495, 3 figs. Furnace designed for economical firing. It employs recuperators of special design for reclaiming heat from waste gases.

Hammer Troubles

Hammer Troubles that Hinder Production. Am. Drop Forger, vol. 5, no. 10, Oct. 1919, pp. 486-489. Such as losses resulting when hammer is not pounding on hot stock. Also board-drop hammers are taken into consideration.

Nickel Chrome Forgings

Nickel Chrome Forgings, J. H. Andrew, J. N. Greenwood and G. W. Green. Iron and Steel Inst., meeting of Sept. 1919, paper no. 1, 93 pp., 26 figs. Investigations of specimens at various stages in process of manufacture are reported and suggestions are formulated relative to various conditions to realize in the castings in order to obtain faultless forgings.

FOUNDRIES

Aluminum Casting

Unsoundness in Aluminum Castings, Robert J. Anderson. Foundry, vol. 47, no. 330, Sept. 1, 1919, pp. 579-584, 24 figs. Results of experiments on porosity and on unsoundness of no. 12 alloy of aluminum, composed roughly of 92 per cent aluminum and 8 per cent copper, interpreted as establishing that number of blowholes present is function of pouring temperature, the higher the pouring temperature the greater being the number of blowholes and the more unsound the casting. It was also determined that unsoundness varies with temperature to which charge is heated, and is function of length of time of melting.

Brass Melting

Considerations Affecting Brass Melting, R. R. Clarke. Can. Foundryman, vol. 10, no. 10, Oct. 1919, pp. 295-298, 2 figs. Things to guard against when brass work is done in iron foundry.

NOTE.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer [s] (Engr. [s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
New York (N. Y.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State Names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
Ventilating (Vent.)
Western (West.)

Bronzes, Zinc

Five Foundry Tests of Zinc Bronzes, C. P. Karr. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2485-2492. 1 fig. Bur. of Standards work with type metal known as "Admiralty bronze" in England and as "Government bronze" in United States and consisting of 88 copper, 10 tin, and 2 zinc.

Centrifugal Casting

Centrifugally Cast Pipe in South America. Iron Age, vol. 104, no. 13, Sept. 25, 1919, pp. 863-865, 7 figs. General features of plants in Brazil and Argentine using DeLavaud process for iron pipe.

Cost System

Practical Up-to-date Foundry Cost System, M. H. Potter. Can. Foundryman, vol. 10, no. 5, May 1919, pp. 124-126, 9 figs. Illustrating requisition cards, moulders' cards, delivery sheet, progress record form and similar cards.

Cupolas

Fuel Economy in Cupola Practice. H. James Yates. Iron and Steel Inst., meeting of Sept. 1919, paper no. 2, 7 pp. Concerning making good heat losses (1) from casing by radiation, (2) due to sensible heat in waste gases, (3) resulting from undeveloped heat in unburned carbonic oxide. Also in Colliery Guardian, vol. 118, no. 3065, Sept. 26, 1919, pp. 834-835.

Design

An Achievement in Foundry Design. Gilbert L. Lacher. Iron Age, vol. 104, no. 13, Sept. 25, 1919, pp. 827-832, 13 figs. Plant of Busch-Sulzer Bros. Diesel Engine Co. described as notable from viewpoint of equipment, transportation facilities, lighting, ventilation and sanitation.

Die Castings

Die-Casting and Die-Casting Metals, Erik Oberg. Machy. (N.Y.), vol. 26, no. 2, Oct. 1919, pp. 155-160, 11 figs. Also in Machy. (Lond.), Oct. 16, 1919, pp. 65-70, 11 figs. Article describes general organization of plant for making die-molded castings, and reviews metals now commercially used in die-casting practice.

Die-Casting, E. N. Dollin. Mech. World, vol. 66, no. 1711, Oct. 17, 1919, pp. 187-189. Reports of various English plants in regard to composition of alloys for different purposes.

Foreign Foundry Practice

Foreign Foundry Practice Analyzed, A. O. Backert. Foundry, vol. 47, no. 18, Nov. 1, 1919, pp. 769-770. Observes that fundamental differences in buyers' requirements render comparison between American and foreign manufacturing methods unfair unless viewpoint is understood.

Handling of Materials

Mechanical Handling of Foundry Material. Iron Age, vol. 104, no. 13, Sept. 25, 1919, pp. 870-872, 4 figs. Plant where manual labor has been replaced by cranes and hoists in handling operations except in cupola charging.

See also Hoisting Equipment.

Hoisting Equipment

Handling Foundry Jobs by Crane, W. C. Briggs. Iron Trade Rev., vol. 65, no. 14, Oct. 2, 1919, pp. 889-891, 3 figs. Illustrating uses of hoisting equipment. Paper presented before Am. Foundrymen's Assn.

Individual Plants

Plant of Hull Iron and Steel Foundries. Can. Machy., vol. 22, no. 13, Sept. 25 1919, pp. 316-317, 3 figs. Special feature said to be that works produce practically all of their own raw material. Description of system of recording and cost keeping.

Ingot Mold Foundry

Bethlehem's Ingot Mold Foundry, E. C. Kreutzberg. Foundry, vol. 47, no. 330, Sept. 1, 1919, pp. 601-603, 7 figs. Direct metal from blast furnaces as well as cupola metal is used. Special attention is called to arrangement for storing and charging coke.

Lathe Casting

Making Castings for Giant Lathes. Foundry, vol. 47, no. 18, Nov. 1, 1919 pp. 772-777, 12 figs. Lengths are specified as 102 in.-swing. Headstock base casting weighs about 70,000 lb., each of boring bench sections weighs over 43,000 lb. and bed sections are from 68,000 to 73,000 lb. in weight.

Malleable-Iron Foundry

Economies in a Malleable-Iron Foundry, A. F. Conant. Iron Age, vol. 104, no. 13, Sept. 25, 1919, pp. 859-861, 5 figs. Effected by eliminating oppressive temperatures and concreted yard. High standard of production said to be maintained by policy of employing non-union labor and paying piece-work scale which nets industrious workers more than union wages.

Molding

Makes Cope and Drag Simultaneously. Iron Trade Rev., vol. 65, no. 17, Oct. 23, 1919, pp. 1118-1119, 4 figs. Combination jar-ram, squeezer and stripping-plate molding machine.

Jolt Ram Moulding, H. Pemberton. Machy. (Lond.), vol. 14, no. 362, Sept. 4, 1919, pp. 689-693, 19 figs. It is said that actual ramming of sand by impact movement of jolt machine results in sand being rammed around pattern in vertical stream lines, thus giving uniformity of packing.

New Molding Machines (Nouvelles machines à mouler). Fonderie Moderne, vol. 12, no. 4, Apr. 1919, pp. 77-80. Described as possessing lifting mechanism and feed and hydraulic motion.

Where Converter Castings Are Made. Foundry, vol. 47, no. 330, Sept. 1, 1919, pp. 608-611, 7 figs. Illustrating plan of foundry showing location of molding machines, core room, melting units, power house and annealing ovens.

Pattern-Drawing Machine

Modern Gray-Iron Foundry in Utah, T. F. Jennings. Foundry, vol. 47, no. 330, Sept. 1, 1919, pp. 587-589, 5 figs. Noting special type of stand for holding cheek used in jar roll-over pattern-drawing machine equipped for making castings.

Patterns

Cylinder Patterns, Joseph A. Shelly. Machy. (N. Y.), vol. 26, no. 2, Oct. 1919, pp. 161-164, 9 figs. For vacuum pumps, core-boxes for jacketed cylinders, cylinder heads, cylinder feet and discharge covers.

Pulverized Coal

Powdered Coal for the Small Foundry, A. J. Grindle. Foundry, vol. 47, no. 16, Oct. 1, 1919, pp. 679-680. While quality of fuel is admitted to be an important consideration, conditions under which it is burned are said to be more so.

Records

Following Work Through the Plant, Alexander Mann. Foundry, vol. 47, no. 333, Oct. 15 1919, pp. 742-754, 4 figs. Illustrating system of recording castings in foundry.

Rigs

Special Rig Aids Foundry Output. Iron Trade Rev., vol. 65, no. 12, Sept. 18, 1919, pp. 769-773, 8 figs. Four machines make molds with green sand cores for tractor transmission housings. Floor space saved by pouring as soon as molds are finished, and shaking out while hot.

Sand Molding

Occurrence and Testing of Foundry Moulding Sands, L. Ueber Cole. Can. Dept. Mines, Mines Branch, Bul. no. 21, no. 476, 1917, 17 pp., 20 figs. partly on 8 supp. plates. With analyses and photomicrographs.

Compares Molding Sand Practice, P. G. H. Boswell. Foundry, vol. 47, no. 330, Sept. 1, 1919, pp. 592-595. Study made by English geologists and molding sand expert sent to America during war by Ministry of Munitions. Outstanding difference in practice on two sides of Atlantic is seen to hinge upon use of artificially bonded high-silica sands.

Semi-Steel

Semi-Steel and General Foundry Practice, David McLain. Can. Foundryman, vol. 10, no. 7, July 1919, pp. 180-183. Concerning possibilities of securing superior quality of gray iron, semi-steel or steel at reduced cost. Address delivered before Southern Metal Trades' Assn.

Silico-Manganese

Silico-Manganese for Steel Castings, E. F. Cone. Iron Age, vol. 104, no. 13, Sept. 25, 1919, pp. 855-857. Responses to circular addressed to foundries in which it was asked to state experience in use of one alloy instead of two.

Synthetic Cast Iron

Synthetic Cast Iron, Charles Albert Keeler. Iron and Steel Inst., meeting of Sept. 1919, paper no. 10, 18 pp., 5 figs. on four suppl. plates. Its origin, development and manufacture by carburizing iron and steel scrap, and more particularly turning by melting these materials in presence of carbon, which is introduced simultaneously with them in melting appliance, notably electric furnace, which is particularly suited for this metallurgical operation. Also in Electrical Review, vol. 85, no. 2183, Sept. 26, 1919, pp. 393-394, 3 figs.

FUELS AND FIRING

Air Furnace

Develop Firing System for Air Furnace, Milton W. Arrowood. Foundry, vol. 47, no. 16, Oct. 1, 1919, pp. 677-679, 2 figs. Burner designed to thoroughly mix powdered coal with air which burns it.

Bituminous Coal

Experiences in using Bituminous Coal as a Substitute for Anthracite, A. Bement. Heat. & Vent. Mag., vol. 16, no. 9, Sept. 1919, pp. 27-30, 1 fig. Changes made in firebox boilers said to have proved effective and suggestions for further improvements.

Brown Coal

Brown Coal as Boiler Fuel. Indus. Australian and Min. Standard, vol. 62, no. 1606, Aug. 21, 1919, pp. 347-349, 3 figs. Experiments conducted at Melbourne City Council's Power Station.

Coke and Coke Breeze

The Calorific Value of Commercial Coke and Coke Breeze, Kenneth Norton. Gas World, vol. 71, no. 1832, Aug. 30, 1919, p. 165, 1 fig. Suggested graphical method of determination.

Fuel Conservation

Methods for More Efficiently Utilizing Our Fuel Resources—XXX, Samuel S. Wyer. Gen. Elec. Rev., vol. 22, no. 10, Oct. 1919, pp. 760-766, 5 figs. Wastes involved in producing, transmitting and distributing natural gas are attributed to present low price of fuel. Conclusion is drawn that adequate conservation will be brought about only by raising price. Such a procedure, it is claimed, would render profitable expense that would have to be incurred by utility company to save its wastes and would induce consumer to use fuel efficiently.

Fuel Economy

Fuel Economy in Manufacturing Works, Charles F. Wade. Eng. & Indus. Management, vol. 2, nos. 11 and 14, Sept. 11 and Oct. 2, 1919, pp. 330-333 and 426-429, 7 figs. Sept. 11: Equipment of boiler plant with a view to securing maximum economy. Oct. 2: Collection and tabulation of running data in connection with boiler plants.

Fuel Economy. Eng. & Indus. Management, vol. 2, no. 13, Sept. 25, 1919 pp. 390-394, 1 fig. Report of committee appointed by British Assn. for Investigation of Fuel Economy.

Fuel Oil

Fuel Oil—I, II, III, Charles W. Geiger. Power Plant Eng., vol. 23, nos. 19, 20 and 21, Oct. 1, 15 and Nov. 1, 1919, pp. 850-852, 908-914 and 958-961, 19 figs. Oct. 1: Present uses of California oil; gravity and heat value; advantages over coal as fuel. Oct. 15: Types of burners and settings; descriptions of plants. Nov. 1: Records of use on Pacific coast steamships, with table showing saving of oil over coal.

Kiln

Notes on Forced Draft Firing in a Periodic Kiln, R. K. Hursh. Clay Worker, vol. 72, no. 4, Oct. 1919, pp. 322-324. Test carried out on round down-draft kiln, 26 ft. in diameter. Air was furnished at pressure of 1¼ to 1¾ in. water gage by a no. 30 Clarage fan.

Oil-Fuel Sprayer

Oil-Fuel Sprayer as Fitted in German Torpedo Boats. Trans. Inst. Mar. Engrs., vol. 31, no. 246, Sept. 1919, pp. 393-395, 1 fig. Parallel portion of needle is provided with three start threads 5/16-in. pitch, which gives whirling motion to oil and assures breaking up of particles for efficient combustion.

Pulverized Coal

The Use of Pulverized Coal, William H. Odell. Steam, vol. 23, no. 4, Oct. 1919, pp. 93-95, 3 figs. Description of Fuller-Lehigh pulverized mill.

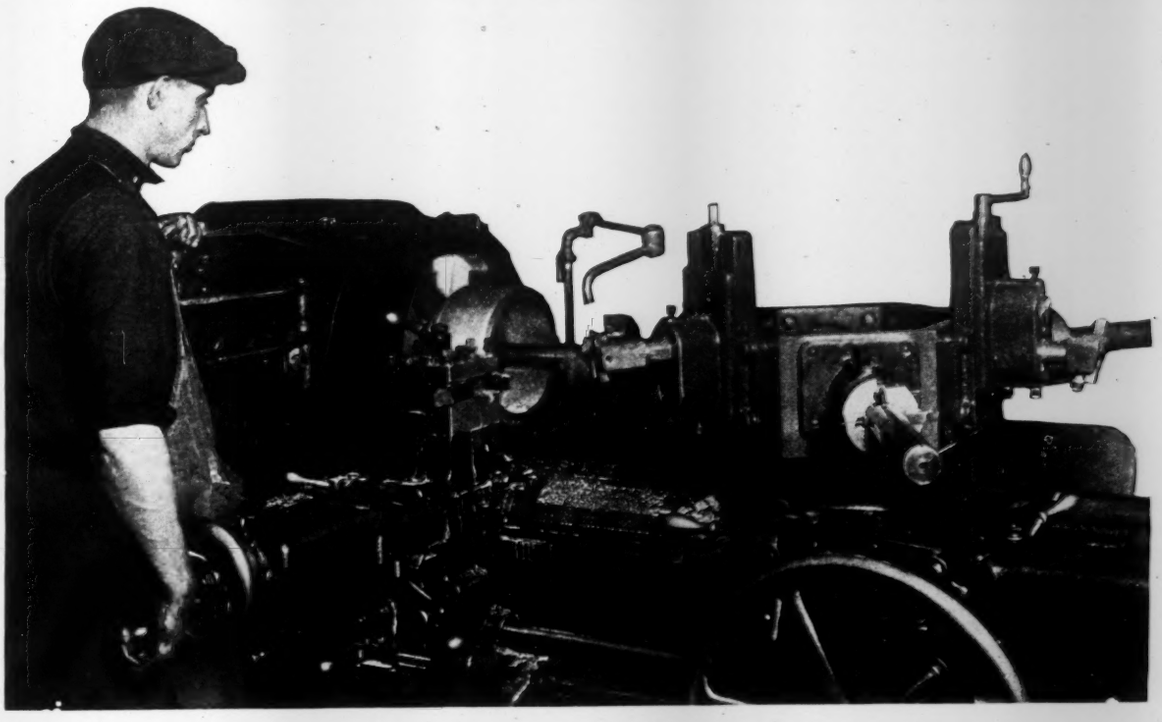
Firing Steam Boilers with Powdered Coal. Power House, vol. 12, no. 16, Oct. 6, 1919, pp. 446-447, 2 figs. Results of tests.

Apparatus for Burning Powdered Coal, Eng. & Indus. Management, vol. 2, no. 11, Sept. 11, 1919, p. 325, 1 fig. Describes Grindle system of burning powdered coal, said to be distinguished by feed screw which runs through wide section of hopper, thus preventing packing of coal.

FURNACES

Heat-Treating Furnaces

Heating Furnaces and Annealing Furnaces—X, W. Trinks. Blast Furnace & Steel Plant, vol. 7, no. 10, Oct. 1919, pp. 490-493, 6 figs. Features determining fuel economy of continuous furnaces.



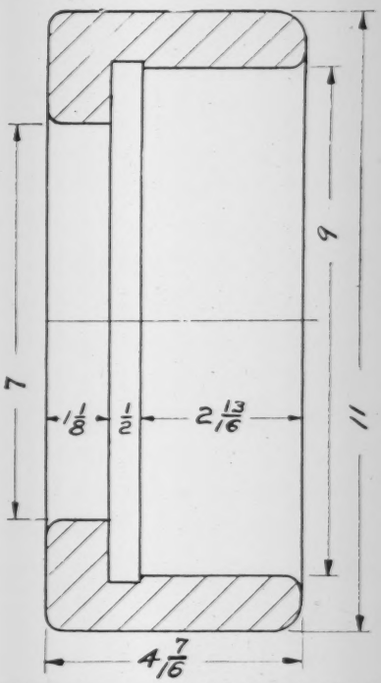
Breaks Another Time Record

The Hahn Manufacturing Company, a jobbing machine shop in Cleveland, reduced production time one-half on this drop forged Clutch Ring when the work was transferred from an engine lathe to a

No. 3-A Universal Hollow Hexagon Turret Lathe

Because of the flexibility of the tool equipment of the No. 3-A, the jobbing shop finds it adaptable for finishing small lots of different pieces as well as long runs of the same piece. Then the time saved by operating both square and hexagon turrets simultaneously, and the wide range of feeds and speeds for all classes of work makes the Universal Hollow Hex the machine for the jobber.

No. 4 Universal, 1½" x 10",	**16" Swing**
No. 2-A Universal, 2½" or 3¼" x 29",	**16½" Swing**
No. 3-A Universal, 3½" or 4¼" x 44",	**21½" Swing**



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Mahr Calorizer and Furnace

Description of a Mahr Calorizer and Furnace. J. H. Rodgers. Can. Machy., vol. 22, no. 14, Oct. 2, 1919, pp. 341-342. 8 figs. Description of oil-burning furnace for forging and heat-treating purposes.

GAGES

Optical Methods

Some Optical Aids for the Engineer—III. Arthur C. Banfield. Machy. (Lond.), vol. 14, no. 363, Sept. 11, 1919, pp. 705-709, 15 figs. Description of method of projection gaging developed by Adam Higer, Ltd., during the war, principally for accurate gaging of small totally reflecting prisms which form Porro erecting system of modern binocular.

Screw Threads

Effect of Angle Error in Connection with the Pitch-Engagement System of Grading Threads. W. G. Dunkley. Machy. (Lond.), vol. 14, no. 362, Sept. 4, 1919, pp. 683-685, 4 figs. Purpose of article is to examine more fully question of effect of angle error or tolerance. Following ways of specifying angle limits are discussed: (1) To fix ideal angle as minimum and to allow positive tolerance, (2) to fix ideal angle as maximum and allow negative tolerance, (3) to fix ideal angle as the mean and allow positive and negative tolerances.

The Pitch Engagement System of grading Screw Threads. W. G. Dunkley. Machy. (Lond.), vol. 15, no. 367, Oct. 9, 1919, pp. 57-58, 3 figs. Suggested methods for determining effective diameter angle of thread profile and pitch. System was described in Machy. (Lond.), vol. 14, p. 529.

GAS ENGINEERING

Gas Analysis

Application of the Interferometer to Gas Analysis. Junius David Edwards. Dept. Commerce, Technologic Papers of Bur. of Standards, no. 131, Oct. 6, 1919, 19 pp. Principle of gas interferometer and its methods of use in gas analysis is discussed in connection with calibration of instrument. Effect produced upon observations by variations in gas composition and experimental conditions is analyzed and equations developed by which magnitude of such changes can be estimated.

Gas Industry

Vital Issues Affecting the Gas Industry Today. John D. Kuster. Gas Age, vol. 44, no. 8, Oct. 15, 1919, pp. 339-343. Heat unit standard, municipal ownership and rate increases. Presidential address before Pacific Coast Gas Assn.

Interferometer

See Gas Analysis.

Low-Grade Gas

What is Low-Grade Gas? Wm. Cranfield. Gas World, vol. 71, no. 1833, Sept. 6, 1919, pp. 178-182 and 183-184. Study of subject by means of flames. Structure and aeration of flames; low-grade gas in use; addition of air; addition of blue water gas; addition of producer gas.

Ovens

Chamber-Type Ovens for Gas Works (Die Verwendung von Kammerofen für Gaswerke), Heinrich Koppers. Journal für Gasbeleuchtung, vol. 62, nos. 29 and 30, July 19 and 26, 1919, pp. 399-405 and 420-421, 10 figs. Preparing coal for gasification. Operating results of horizontal ovens with regenerative heating.

Retort House

Easily effected Economies in the Retort House. Carl B. Wyckoff. Am. Gas Eng. Jl., vol. 111, no. 13, Sept. 27, 1919, pp. 271-272 and 276-283, 9 figs. Furnace operation and design, iron and brick work, scurfing retorts, stand pipes, bridge pipes, hydraulic main, drafts and other features are discussed.

Practical Hints on Retort-House Operation. Carl B. Wyckoff. Gas Age, vol. 44, no. 8, Oct. 15, 1919, pp 345-350, 6 figs. Suggestions in regard to selecting type of grate and clinker doors, manner and frequency of scurfing, cleaning stand pipes and taking care of hydraulic main. (To be continued.)

Retorts

New Types of Retorts for Medium and Small Gas Works (Neue Ofensysteme für mittlere und kleinere Gaswerke). G. Aicher. Journal für Gasbeleuchtung, vol. 62, no. 29, July 19, 1919, pp. 397-398. Details of Munich type sloping-chamber retorts.

Study on Gas Retorts and Heat Economy (Wärmewirtschaftliche Betrachtungen über Gaserzeugungsöfen). Osw. Peischer. Journal für Gasbeleuchtung, vol. 62, no. 28, July 12, 1919, pp. 381-385, 2 figs. Operating data of recuperative retorts obtained in tests lasting one week.

Vertical Retorts Lend Themselves to Steaming with Better Results than in the Case of Horizontals. L. J. Willien, Jr. Am. Gas Eng. Jl., vol. 111, no. 16, Oct. 18, 1919, pp. 367-371, 386 and 389. Because, it is noted, by introducing steam at bottom and allowing it to pass up through retorts highly heated upward current of blue water gas is established at beginning of carbonizing period, and this helps to dilute rich gases without absorption or loss of heat and with greatly accelerated rate of travel towards gas outlet. Paper read before Am. Gas Assn.

Separator, Centrifugal

New Centrifugal Gas Separator. Gas Jl., vol. 147, no. 2939, Sept. 9, 1919, pp. 554-555, 3 figs. Separated impurities are said not to be thrown against fixed wall of casing, but to collect on inner surface of revolving drum, from the wider edge of which they are thrown into liquor gutter.

Steaming Horizontals

Steaming Horizontals. R. J. Rew. Gas Jl., vol. 147, no. 2939, Sept. 9, 1919, pp. 557-559, 2 figs. Discussing advantages of short-period steaming; channel retorts; superheater difficulties; mixing of gas; loss in coke and wear and tear on retort.

Sulphur Removal

Removal of Sulphur from Illuminating Gas. W. W. Odell and W. A. Dunkley. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2301-2311. Because coals containing less than 1 per cent sulphur are becoming scarcer, it is pointed out that gas industry will be compelled to use coals that are now considered out of the question. Present processes of purification are outlined and discussed.

HANDLING OF MATERIALS

Army Supply Base

Boston Army Supply Base. Pac. Mar. Rev., vol. 16, no. 10, Oct. 1919, pp. 110-113, 4 figs. Noting special freight-handling equipment.

Barge-Unloading Devices

Barge-Unloading Devices of Missouri Sand and Gravel Producers. Rock Products, vol. 22, no. 19, Sept. 13, 1919, pp. 24-26, 10 figs. Various types of derricks and travelers using clamshell buckets handle material from river barge to plant or stock pile.

Cement Materials

Conveying Raw Cement Materials. W. A. Scott. Cement, Mill & Quarry, vol. 15, no. 7, Oct. 5, 1919, pp. 11-13, 5 figs. Details of crushing and loading plant of International Portland and Cement Co. on Lake Pend Oreille, Northern Idaho.

Chemical Materials

Mechanical Handling of Chemical Materials. George Fred. Zimmer. Chem. Age, vol. 1, nos. 11 and 12, Aug. 30 and Sept. 6, 1919, pp. 294-296 and 322-323, 9 figs. With reference to nature of material and conditions to be met. The handling of coarse, crystalline or amorphous substances of fine dry powders, fine moist material, etc.

HEAT TREATING

Aluminum-Alloy Castings

Heat Treatment of Aluminum-alloy Castings. Zay Jeffries and W. A. Gibson. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2493-2512, 17 figs. Heat treatment of rolled and extruded aluminum alloy consists essentially in heating to temperature near 500 deg. cent. and quenching in water. It is suggested that non-uniform results obtained from heating aluminum-alloy castings in ordinary furnace atmosphere are due to porosity and oxidation of castings. Method designed to remedy these defects is proposed.

Case Hardening

Practical Talks on Casehardening; Why Failures Occur in Casehardening. T. G. Selleck. Jl. Am. Steel Treaters Soc., vol. 2, no. 1, Oct. 1919, pp. 40-47, 4 figs. Writer believes that the human element in carbonizing process "is responsible for all its failures."

Cast Steel

Heat Treatment of Cast Steel. John H. Hall, Arcid E. Nissen and Knox Taylor. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2881-2922, 104 figs. Results of experimental work conducted on steel made in 3-ton button-blown converter, most of steel analyzing about 0.05 in phosphorus and sulphur. Numerous photomicrographs of steel specimens are presented.

Copper-Oxide Annealing

Copper Diffuses Through Cast Iron. H. E. Diller. Foundry, vol. 47, no. 18, Nov. 1, 1919, pp. 779-780, 8 figs. Results of annealing experiments with copper oxide packing, in which graphite changed so that it appeared like temper carbon.

Gun Metal

Influence of Heat Treatment on Gun Metal. C. F. Smart. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1875-1881, 9 figs. Investigation undertaken to study effect of annealing followed by different rates of cooling and in particular effect of quenching. Specimens quenched in water from 650 deg., 705 deg., or 760 deg. fahr. were found lacking in strength and ductility.

Heat-Treating Furnaces

Heating Furnaces and Annealing Furnaces—IX. W. Trinks. Am. Drop Forger, vol. 5, no. 10, Oct. 1919, pp. 495-498, 6 figs. Features determining the fuel economy of continuous furnaces; rate of heat transmission; fuel economy for best working conditions and overall fuel economy, including mill delays.

See also Furnaces; Electrical Engineering, Furnaces (Heat Treating).

Malleable Iron

Experiments in Annealing Malleable Iron. H. E. Diller. Can. Foundryman, vol. 10, no. 7, July 1919, pp. 184-186, 4 figs. Results of tests are interpreted as having indicated that it is immaterial whether bars are cooled slowly or rapidly after they have reached 500 deg. cent.

Nichrome Castings

Nichrome Castings for Heat Treatment. Harrison Jenkins. Can. Foundryman, vol. 10, no. 10, Oct. 1919, pp. 299-300, 2 figs. Raw material, vol. 1, no. 7, Sept. 1919, pp. 341-342, 3 figs. Points of merit in properties of nichrome for use as material in heat-treating receptacles.

Pulverized Coal

Using Pulverized Coal for Annealing. Charles Longenecker. Foundry, vol. 47, no. 16, Oct. 1, 1919, pp. 680-681, 3 figs. Table showing typical run illustrates uniform temperature maintained with powdered coal.

Quenching Liquids

Cooling Properties of Technical Quenching Liquids. N. B. Pilling and T. D. Lynch. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2347-2367, 23 figs. Experiments made with cylinder, 50 mm. long, 6 mm. in diameter and made from nickel with 5 per cent silicon. Method used involved recording of fleeting temperatures within cylinder after being heated to fixed initial temperature and rapidly transferred to bath of quenching liquid. Quenching liquids used were water, brine, soap solution, three oils and sulphuric acid.

HEATING AND VENTILATION

Factory Buildings

The Ventilation of Factory Buildings. Eng. & Indus. Management, vol. 2, no. 15, Oct. 9, 1919, pp. 460-461, 2 figs. Importance of considering ventilation before designing factory.

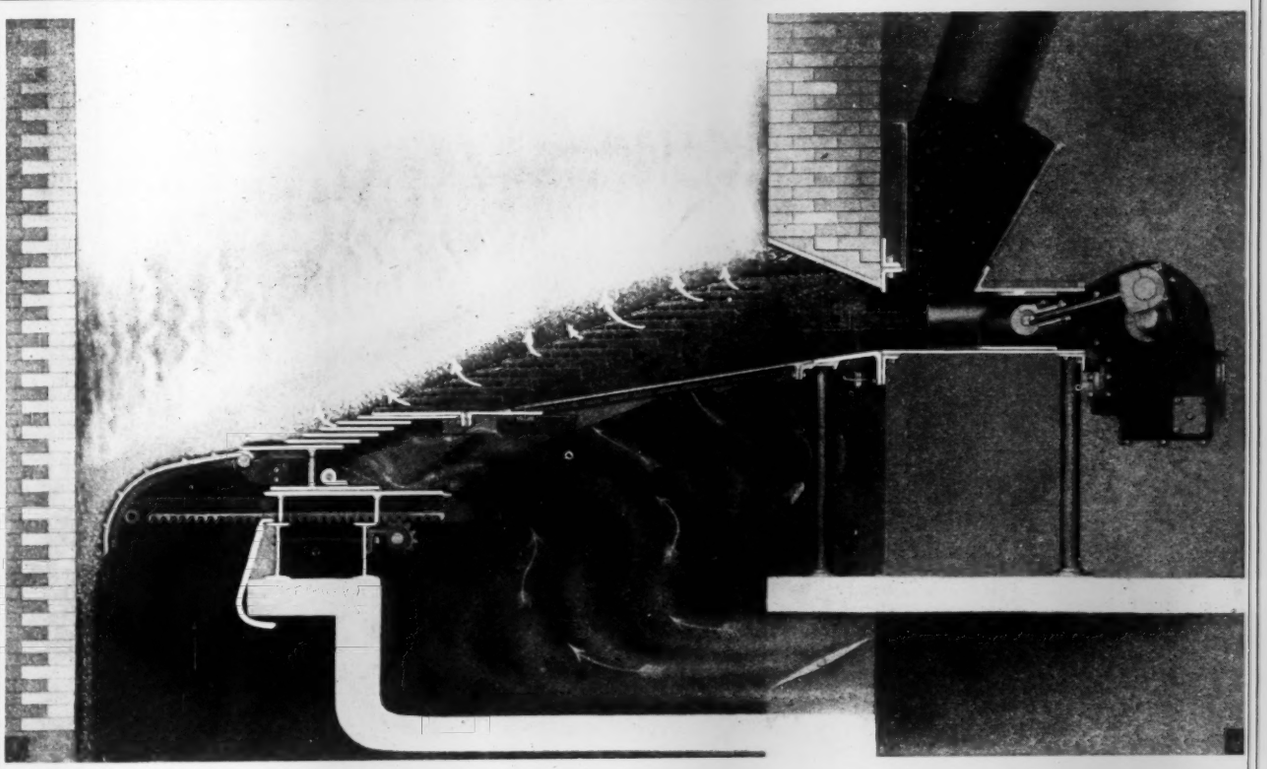
The Ventilation of Industrial Establishments. Leonard Hill. Eng. & Indus. Management, vol. 2, no. 11, Sept. 11, 1919, pp. 326-328, 1 fig. Problem of ventilation is considered from three points of view: (1) cooling and evaporative powers of air, (2) keeping of air free from noxious fumes or dust arising in process of manufacture, (3) spacing of workers. Author presents suggestions with a view to minimizing spread of infection among workers.

Heating Load Forecast

Forecasting Heating Loads. William B. Campbell. Heat & Vent. Mag., vol. 16, no. 10, Oct. 1919, pp. 19-22, 16 figs. From examination of curves representing annual range for "normal" outdoor temperature of locality as constructed from government records extending back for long periods.

Isolated Rooms

More Air for Offices and Drafting Rooms. Charles L. Hubbard. Factory, vol. 23, no. 5, Nov. 1919, pp. 1050-1052, 10 figs. Showing how ventilation in isolated rooms may be improved and draft prevented.



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Nozzle Effect

See Ship Ventilation.

Remodeling Heating System

Remodeling a Heating System, Helen R. Innis. Heat. & Vent. Mag., vol. 16, no. 10, Oct. 1919, pp. 30-32, 1 fig. How piping connections were rearranged in building in order to secure greater economy and efficiency.

Ship Ventilation

Utilization of the Nozzle Effect for Ventilating Ships (Die Ausnutzung der Düsenwirkung für die Lüftung auf Schiffen), Freudenthal. Schiffbau, vol. 20, no. 19, July 9, 1919, pp. 518-522, 13 figs. Discussing older and more recent tests with water; utilization of nozzles for carrying off of water, steam and sounds. (To be concluded.)

Ventilating Equipment and Health

Ventilating Equipment Reduces Mortality during Winter, E. Vernon Hill. Domestic Eng., vol. 89, no. 4, Oct. 25, 1919, pp. 167-168, 2 figs. Based on statistical figures of Octennial Report of Department of Health of City of Chicago.

HOISTING AND CONVEYING

Bucket Gear

A New Type of Enclosed Gear Bucket. Coal Trade Jl., vol. 50, no. 43, Oct. 22, 1919, pp. 1245-1246, 1 fig. Design in which all working parts are enclosed in tight casing, eliminating wear and facilitating lubrication.

Cranes

Overhead Electric Cranes in Steelworks, James Smith. Elecn., vol. 83, no. 2158, Sept. 26, 1919, pp. 355-362, 17 figs. Application in steel works of various types of overhead electric cranes such as traveling cranes, lifting magnets and charging machines.

Portable Floating Cranes of Huge Capacity. Commercial America, vol. 16, no. 3, Sept. 1919, pp. 43-49, 3 figs. Designed to lift 150 tons at radius of 105 ft. and at speed of 4 ft. per min. with vertical range from 25 ft. below to 95 ft. above level of water.

Protecting Mill Cranes from Overload, A. G. Place. Blast Furnace & Steel Plant, vol. 7, no. 10, Oct. 1919, pp. 493-494. Recommends protection of individual circuits rather than main line. Paper read before Assn. of Iron & Steel Elec. Engrs.

Grain Elevators

The Palatine Patent Grain Elevator and Automatic Weighing Machine. Eng. & Indus. Management, vol. 2, no. 13, Sept. 25, 1919, pp. 414-415, 6 figs. It consists of hopper supported by three columns from ordinary lorry body. Hopper is provided with two automatic weighing machines suitable for filling sacks. Grain is elevated by buckets mounted on chains revolving on sprockets.

Heel Angles for Different Loads

Crane Lighter No. 4. Engineer, vol. 128, no. 3323, Sept. 5, 1919, pp. 225-226, 12 figs., partly on supp. plates. Diagrams showing angles of heel for various loads.

Winding Plant

Notes on the Overhead Koepe Winding Plant at Plenmeller Colliery, Haltwhistle, Northumberland. George Baw. Trans. North of England Inst. Min. & Mech. Engrs. vol. 68, no. 7, Aug. 1918, pp. 186-202 and (discussion) 202-204, 9 figs. Koepe hoist, applied first by Fr. Koepe in Westphalia, is described as winding counterpart of endless rope haulage in much the same way as drum winder is to main-and-tail rope haulage.

HYDRAULIC MACHINERY

Flow Measurement

The Orifice as a Means of Measuring Flow of Water through a Pipe, Raymond E. Davis and Harvey H. Jordan. Univ. of Illinois Bull., vol. 16, no. 14, Dec. 2, 1918, 56 pp., 14 figs. Results of tests made to determine practicability of using flow of water by means of thin-plate circular orifice inserted in pipe, to determine experimental coefficients for calculating flow in pipe and discharge, and to determine conditions most favorable to use of such an orifice as flow-measuring device.

Governors for Turbines

Seewer Universal Governor for High-Pressure Hydraulic Turbines (Le régulateur universel système Seewer pour turbines hydrauliques à haute chute). A. Strickler. Bulletin Technique de la Suisse Romande, vol. 45, nos. 18, 19 and 20, Sept. 6, 20 and Oct. 4, 1919, pp. 181-184, 193-197 and 205-206, 11 figs. Sept 6: Mechanism connecting guiding plates with regulating rod. Sept. 20: Account of official tests at laboratory of Federal Polytechnic School at Zurich. Oct. 4: Operation of guide plates in controlling form of jet. (Concluded.)

Hydrodynamic Analogies

Hydrodynamic Analogies (Analogie idrodinamiche), G. Spataro. Annali d'Ingegneria e d'Architettura, vol. 34, nos. 5 and 6, March 1 and 15, 1919, pp. 73-76 and 82-90. Generalization of law of reciprocity. Method is along lines followed by Lorentz in his demonstration of this law for viscous liquids.

INTERNAL-COMBUSTION ENGINES

Air Washers

Air Washers for Internal-Combustion Motors (Ueber Luftfilter für Explosionsmotore), Thieme. Motorwagen, vol. 22, no. 15, May 31, 1919, pp. 268-270, 5 figs. Radio air filter in air duct of older type of air suction.

Alcohol Engines

Alcohol Engines. Times Eng. Supp., vol. 15, no. 540, Oct. 1919, pp. 320, 1 fig. Tests and experiments on starting of internal combustion engines from cold made by Committee on Alcohol and Fuel appointed by Commonwealth of Australia Institute of Science and Industry.

Crossley Heavy-Oil Engine

Crossley Cold-Starting Heavy-Oil Engine. Engineer, vol. 128, no. 3324, Sept. 12, 1919, pp. 252-254, 5 figs. Combustion chamber is of spheroidal shape. This, it is said, gives least wall surface exposed to water jacket and permits of central core of air being heated by compression and cooled as little as possible by contact with walls.

Diesel Engines

Notes on Operation of Submarine Diesel Engines, Frederick C. Sherman. Jl. Am. Soc. Naval Engrs., vol. 31, no. 3, Aug. 1919, pp. 615-623. Notes taken by writer while operating under war conditions submarine Diesel engines of 440 hp., 4-cycle, 6-cylinder type installed on O-class of submarines.

Fuels

Power Characteristics of 20 Per Cent. Benzol Mixture, Jl. Soc. Automotive Engrs., vol. 5, no. 3, Sept. 1919, pp. 272-274, 4 figs. Based upon tests made in altitude laboratory of Bureau of Standards.

Governors for Gas Turbines

Governors for Constant-Pressure Internal-Combustion Turbines when using Turbo-Compressors (Beitrag zur Frage der Regulierung der Gleichdruck-Verbrennungsturbine bei Verwendung von Turbo-Compressoren), Adolf Borger. Zeitschrift für das gesamte Turbinenwesen, vol. 16, no. 14, May 20, 1919, pp. 128-134, 11 figs. Comparison and practical application of governing methods in filling. Overload and mixture are also discussed. (Concluded.)

Horsepower Formula

A Practical Brake Horse Power Formula for Internal-Combustion Engines, Hermann Lemp. Gen. Elec. Rev., vol. 22, no. 10, Oct. 1919, pp. 808-809, 1 fig. Numerical coefficients of familiar formula for indicated horse power are combined into single round number 100,000,000.

Natural Gas

Natural Gas for Power, F. H. Bivens. Natural Gas & Gasoline Jl., vol. 13, no. 10, Oct. 1919, pp. 352-354, 1 fig. How to equip an internal-combustion engine to use natural gas.

Supercharging

The Supercharging of Internal-Combustion Engines—I, Georges Funck. Automobile Engr., vol. 9, no. 131, Oct. 1919, pp. 318-322, 5 figs. Technical study of possibilities and limitations of forced induction.

Valves

High-Chromium Steel for Exhaust Valves. Jl. Soc. Automotive Engrs., vol. 5, no. 3, Sept. 1919, pp. 262-263, 2 figs. Properties and uses. From report of Sub-Division appointed at joint meeting of Iron and Steel Division of Soc. of Automotive Engrs. Standards Committee and Sub-Committee X, Committee A-1 of Am. Soc. for Testing Materials.

LUBRICATION

Oil Testing

Lubrication and Lubricating Oils, R. C. Demary. Power Plant Eng., vol. 23, no. 21, Nov. 1, 1919, pp. 955-958. Suggested tests for oils and summary of characteristics desirable for different purposes.

Power-Plant Management—II, Robert June. Refrig. World, vol. 54, no. 10, Oct. 1919, pp. 25-26 and 30. Importance of viscosity tests as guide to lubrication.

Power-Plant Lubrication

Power Plant Management—Lubrication, Robert June. Power House, vol. 12, no. 15, Sept. 20, 1919, pp. 411-413, 2 figs. Data relative to lubrication problems usually found in power plants.

Viscosity

See Oil Testing.

MACHINE ELEMENTS AND DESIGN

Crankshafts

Engine Crankshafts, Edward Ingham. Elec. Rev., Lond., vol. 85, no. 2182, Sept. 19, 1919, pp. 359-360. As principal causes of failure are stated: (1) unsuitable material; (2) restricted dimensions; (3) want of alignment; (4) fatigue; and (5) overloading.

Interchangeable Manufacture

Machine Design in Interchangeable Manufacturing Practice, Earle Buckingham. Machy. (Lond.), vol. 15, no. 366, Oct. 2, 1919, pp. 18-20. Considerations in regard to simplifying design to enable standard equipment to be used and factors governing choice of material.

Pulleys

Some Suggestions on Pulleys. Paper, vol. 25, no. 3, Sept. 24, 1919, pp. 15-18, 3 figs. States points that should be kept in mind when purchasing a pulley; strength, weight, coefficient of friction, balance, ease of mounting and durability.

Rings

The Bending of Thin Rings, John Prescott. Automobile Engr., vol. 9, no. 130, Sept. 1919, pp. 295-302, 13 figs. Investigation having special reference to behavior of piston rings under radial pressures.

Screws

The Strength of Screws, Bolts and Nuts, C. E. Stromeyer. Can. Machy., vol. 22, no. 13, Sept. 25, 1919, pp. 320-321. Data regarding items of mechanical design as stated in author's memorandum to Manchester Steam Users' Assn.

Springs

Laminated Springs—I, T. H. Sanders. Automobile Engr., vol. 9, no. 131, Oct. 1919, pp. 333-341, 20 figs. Theoretical characteristics of design.

Parallel Helical Springs, R. J. Cousins. Automobile Engr., vol. 9, no. 130, Sept. 1919, pp. 302-304, 4 figs. Method for quickly determining their approximate dimensions.

Williams Internal Gearing

Design and Calculation of Williams Internal Gearing, Reginald Trautschold. Machy. (N. Y.), vol. 26, no. 2, Oct. 1919, pp. 110-115, 5 figs. In Williams system, profiles of internal gear teeth are straight lines so that tooth spaces are similar to those of involute rack, while teeth of mating pinion have curved profiles of conjugate form.

MACHINE SHOP

Automatic Machines

Production Milling on Automatic Machines, Edward K. Hammond. Machy. (N. Y.), vol. 26, no. 2, Oct 1919, pp. 150-154, 11 figs. Also Machy. (Lond.), vol. 14, no. 364, Sept. 18, 1919, pp. 741-748, 14 figs. Machines built by Pratt & Whitney Co., Hartford, Conn. These millers have been evolved from Lincoln type and are equipped with intermittent table feed and fast traversing mechanism, and automatic quick return for table. Practice in milling of duplicate parts. Second of two articles.

Belt Adjustments

Unusual Adjustments of Belts, Pulleys and Shafting, H. C. Shields, Jr. Belting, vol. 15, no. 6, Sept. 20, 1919, pp. 24-25, 8 figs. General suggestions for superintendent and shop foreman.

Conveyors for Jigs

How Two Conveyors keep Jigs in Use, P. F. O'Shea. Factory, vol. 23, no. 5, Nov. 1919, p. 1045. Instead of waiting for jigs to pile up and then returning them in a bunch, this conveyor is said to return them to start of process so that they get back into use quickly.

Cutters, Milling

The Fastening of Milling Cutters, Joseph Horner. Machy. (Lond.), vol. 14, no. 363, Sept. 11, 1919, pp. 710-713, 46 figs. Showing methods used for driving cutters, forms of end mill fittings, methods for securing arbors, and examples of collet chucks.

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Gear Cutting

Tooth Gear Cutting, W. Duckett. Machy. Market, no. 986 and 987, Sept. 26 and Oct. 3, 1919, pp. 21-22 and 23-24, 6 figs. Review of methods and machines. Sunderland gear cutter and Fellows gear shaper. Paper read before Coventry Eng. Soc.

Jigs

A Discussion of the Various Types of Jigs, Robert Mawson. Can. Machy., vol. 21, nos. 15 and 17, Oct. 16 and 23, 1919, pp. 387-390 and 407-410, 22 figs. Noting specially variations of fundamental principle involved in order to suit various requirements. Article is illustrated by reference to shop practice. Open type location jigs and holding jigs.

Metal-Cutting Tools

Relation of Heat Treatment, Design and Selection of Steels for Metal Cutting Tools to Factory Production, C. P. Berg. Jl. Am. Steel Treaters Soc., vol. 2, no. 1, Oct. 1919, pp. 7-11. Writer observes that it is first necessary to have proper kind of metal anu tool, and secondly, to know how to use it in order to obtain maximum production in a factory. As there is no proper kind of cutting tool unless it is properly heat-treated, he concludes: "It appears that development of proper heat-treating process is most important for securing successful production."

Models

Purpose of Models in Interchangeable Manufacturing, Earle Buckingham. Machy. (N. Y.), vol. 26, no. 2, Oct. 1919, pp. 129-130. Also Machy. (Lond.), vol. 15, no. 367, Oct. 9, 1919, pp. 59-60. Points out relative value of models in constructive development of new article which is to be made in large quantities by interchangeable methods.

Pump Repairs

Repairing a Large Centrifugal Pump, J. H. Rodgers. Can. Machy., vol. 22, no. 13, Sept. 25, 1919, pp. 322-323, 2 figs. Completed work said to have meant a saving in time of several weeks and nearly $2,500 to contractor.

Taylor Methods

Supplement to Frederick W. Taylor's "On the Art of Cutting Metals"—II, Carl G. Barth. Indus. Management, vol. 58, no. 4, Oct. 1919, pp. 282-287, 5 figs. How principles and experimental results of cutting metals are applied in machine-shop practice.

Turret-Lathe Practice

Turret-Lathe Practice, Erik Oberg. Machy. (N. Y.), vol. 26, no. 2, Oct. 1919, pp. 99-109, 31 figs. Examples of turret lathe practice based upon experience and practice of Service Dept. of Gisholt Machine Co., Madison, Wis.

MACHINERY, METAL-WORKING

British Shops

The Works and Products of Messrs. Barr and Stroud, Limited. Engineering, vol. 108, no. 2800, Aug. 29, 1919, pp. 263-266 and 278, 11 figs, partly on two supp. plates. Details of machine shops, with reference specially to automatic and gear-cutting machines.

Chucks

Collet Chucks—X, Fred Horner. Mech. World, vol. 66, no. 1708, Sept. 26, 1919, pp. 146-147, 4 figs. Example of chuck which incorporates geared lever action in combination with cam ring and ball closing. (Concluded.)

Cutters, Milling

Inserted-Tooth Milling Cutters. Machy. (Lond.), vol. 14, no. 354, Sept. 18, 1919, pp. 753-754, 5 figs. Tables showing proportions of various types of cutters.

Lathes

A New Form of Lathe and Some of Its Products. Automotive Industries, vol. 41, no. 13, Sept. 25, 1919, pp. 624-626, 9 figs. Description of a machine which is said to simplify multi-tool operations in several ways.

Notes on Capstan and Turret Lathes—IV, Joseph Horner. Mech. World, vol. 66, no. 1709, Oct. 3, 1919, pp. 158-159, 3 figs. Types of vertical-axis and inclined-axis designs.

Machine-Tool Developments

Recent Machine-Tool Developments—IV and V, Joseph Horner. Engineering, vol. 108, no. 2800 and 2802, Aug. 29 and Sept. 12, 1919, pp. 266-271 and 330-332, 37 figs. Drilling machine framings: pillar machines. Beds, ways and reciprocating slides, planers, shaping, machine-framing and milling machines.

Milling Machines

The Ingersoll Differential Type Continuous Milling Machine, J. V. Hunter. Am. Mach., vol. 51, no. 14, Oct. 2, 1919, pp. 645-650, 6 figs. It consists of two main parts, namely, work-carrying table and head-carrying milling-cutter spindles, each of which may be arranged for simultaneous operation on different pieces of work.

Planer, Bevel-Gear

Sunderland 24-inch Bevel Gear Planer. Machy. (Lond.), vol. 15, no. 367, Oct. 9, 1919, pp. 40-42, 6 figs. Machine is based on principle that bevel gear teeth require to be planed along lines which meet at apex of cone, cross-section of teeth being in proportion to their distance from apex.

Thread-Milling Machines

British Thread-Milling Machines—I and II, Engineer, vol. 128, no. 3324 and 3325, Sept. 12 and 19, 1919, pp. 249-252 and 274-277, 15 figs. Machine built by Charles Taylor, Ltd., Birmingham. Both headstocks are adjustable on slots within base plate, work headstock longitudinally and cutter headstock transversely. Machine is capable of cutting either internal or external, right-hand or left-hand threads.

MACHINERY, SPECIAL

Cylinder Boring and Reaming Fixtures

Cylinder Boring and Reaming Fixtures. Machy. (Lond.), vol. 14, no. 362, Sept. 4, 1919, pp. 680-683, 11 figs. Different designs of fixtures for locating and holding automobile engine cylinder castings during boring and reaming operations.

Dredge, Hydraulic

Features of Electrically Operated Hydraulic Dredge, Charles W. Geiger. Cement, Mill & Quarry, vol. 15, no. 6, Sept. 20, 1919, pp. 35-37, 5 figs. Description of dredge owned and operated by City of Oakland, Cal.; advantages of electric drive and savings effected. Central-station service is used.

Excavating Machinery

British Excavating Machinery, A. E. Collins. Eng. & Contracting, vol. 52, no. 18, Oct. 29, 1919, pp. 492-493, 3 figs. Blondin machine which consists of steel wire main cable suspended between two towers; on main cable runs load-carriage supporting hoisting block. From Water & Water Eng., Lond.

Steam Pile Hammers

Steam Pile Hammers. Bulletin of Gen. Contractors Assn., vol. 10, no. 8, Aug. 1919, pp. 159-161, 3 figs. Uses of various types.

Tin-Plate Machine

Invent Novel Tin-Plate Machine. Iron Trade Rev., vol. 65, no. 16, Oct. 16, 1919, pp. 1054-1055, 2 figs. Four plates handled simultaneously in unusual type of machine in Welsh mill which automatically feeds, pickles, tins and cleans plates at rate of 125 boxes in 24 hr.

MACHINERY, WOODWORKING

Sawing Machine

Rapid Vertical Sawing Machine. Engineering, vol. 108, no. 2801, Sept. 5, 1919, pp. 308-309, 8 figs. Hack-sawing machine capable of cutting through bar 9 in. in diameter and of beveling 12-inch girder at any angle, and also suitable for cutting out forks of connecting rod forgings.

MATERIALS OF CONSTRUCTION AND TESTING OF MATERIALS

Bearing Metals

Observations on a Typical Bearing Metal, Hilda E. Fry and W. Rosenhain. Automobile Engr., vol. 9, no. 131, Oct. 1919, pp. 323-325, 14 figs. Microscopic examinations and Brinell measurements of alloy consisting of 4 per cent copper, 9 per cent antimony and 87 per cent tin. Paper presented before Inst. of Metals.

Bronzes, Lead-Zinc

Physical Properties of Certain Lead-Zinc Bronzes, Homer F. Staley and C. P. Karr. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2513-2522, 5 figs. Of nine variations in composition of lead-zinc bronzes containing 90 per cent copper studied, the one found to be most satisfactory contained 90 per cent copper, 6.5 per cent tin, 0.5 per cent lead, and 3 per cent zinc. This composition showed proportional limit of 12,200 ± 650 lb. per sq. in., tensile strength 40,700 ± 1500 lb. per sq. in., elongation in 2 in. of 37.6 ± 6.4 per cent, and reduction in area of 34.1 ± 4.5 per cent.

Chrome-Nickel Steels

See Nickel-Chrome Steels.

Constantan

Manufacture and Electrical Properties of Constantan, F. E. Bash. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2409-2430, 12 figs. Experiment work conducted by International Nickel Co. in co-operation with Electrical Alloys Co. for the purpose of developing constantan that would give e.m.f. of 47.40 millivolts against pure iron at 1500 deg. fahr.

Insulators, Heat

The Thermal Conductivities of Insulators in Relation to the Lagging of Steam Pipes, R. Thomas. Chem. Indus., vol. 38, no. 19, Oct. 15, 1919, pp. 357t-360t, 5 figs. Results of experiments are tabulated and curves are given showing effect of thickness of insulator on heat lost.

Leather Substitutes

Leather Substitute Products and Markets. Raw Material, vol. 1, no. 7, Sept. 1919, pp. 322-327, 7 figs. $50,000,000 worth of leather substitutes said to be produced and consumed annually in the U. S. A.

Malleable-Iron Machinability

Machining Qualities of Malleable, Edwin K. Smith and Wm. Barr. Foundry, vol. 47, no. 16, Oct. 1, 1919, pp. 682-684, 2 figs. Cutting and drilling tests made on malleable iron samples with different physical properties to determine relation of high elongation and tensile strength to machinability of metal.

Nickel

Physical Properties of Nickel, David H. Browne and Joan F. Thompson. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2693-2720. Synopsis of information found in textbooks and reports of various investigators, compiled for use by practical men.

Nickel-Chrome Steel

Temper-Brittleness of Nickel-Chrome Steel, R. H. Greaves. Iron and Steel Inst., meeting of Sept. 1919, paper no. 7, 20 pp., 7 figs. By "temper-brittleness" is meant condition induced in nickel-chrome steel by slow cooling from tempering temperature, and revealed by low absorption of energy in single blow impact test on notched bars. With a view to promote discussion on subject, writer presents results of experiments which he performed to determine effect of slow cooling after tempering on impact figure of these steels.

Brittleness in Nickel-Chrome and Other Steels, F. Rogers. Iron and Steel Inst., meeting of Sept. 1919, paper no. 11, 4 pp. Tests to examine possibility of discriminating as to toughness or brittleness without destroying article.

Fatigue Tests of Nickel and Chrome-Nickel Steel. Eng. World, vol. 15, no. 8, Oct. 15, 1919, pp. 31-34, 4 figs. It is concluded that static elastic strength is not reliable index of fatigue resisting strength under repeated stress, and that perfection of surface finish is appreciable factor in developing resistance to fatigue under repeated stress. Paper presented before Am. Soc. for Testing Materials.

Notched-Bar Tests

Notched Bar Tests, W. C. Unwin. Engineering, vol. 108, no. 2802, Sept. 12, 1919, pp. 329-330. Suggestions in regard to establishing empirical formula for reduction.

Rolling of Steel and Mechanical Properties

Influence of Rolling on Mechanical Properties of Steel (Observations sur le corroyage de l'acier), Ch. Fremont. Génie Civil, vol. 75, no. 1936, Sept. 20, 1919, pp. 274-276, 6 figs. Experiments similar to those described by Georges Charpy (see C. R. July 1, 1918, and Revue de Metallurgie, Sept.-Oct. 1918) are reported and it is claimed that longitudinal deformations obtained did not have undulations described by M. Charpy.

Steel, Physical Tests

Practical Notes on Physical Tests of Steel—II, Austin B. Wilson. Am. Drop Forger, vol. 5, no. 10, Oct. 1919, pp. 499-501, 3 figs. Also Blast Furnace & Steel Plant, vol. 7, no. 10, Oct. 1919, pp. 500-502, 3 figs. Discussion of hardness test: sclerometric methods; Brinell tests; Shore scleroscope; Fremont, Charpy and Izod dynamic tests; practical notes for conducting tests to secure accurate results.

Steel, Testing by Magnetic Analysis

Testing Steel by Magnetic Analysis, R. L. Sanford. Iron Trade Rev., vol. 65, no. 18, Oct. 30, 1919, pp. 1181-1183, 10 figs. Apparatus used and results obtained. Paper presented before Am. Iron & Steel Inst.

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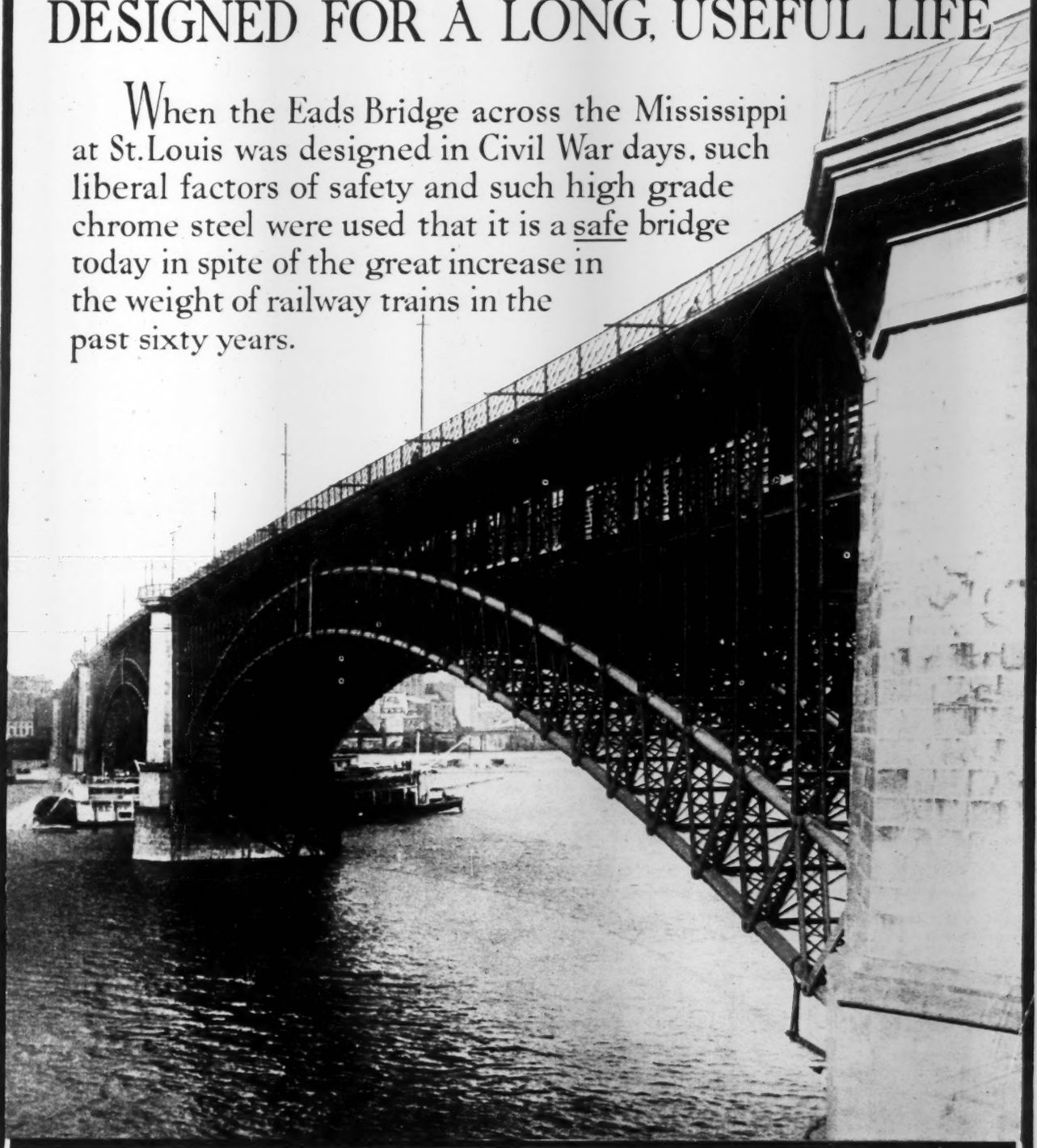

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Stellite

Stellite, the New Cobalt Alloy, Thomas Southworth. Can. Chemical Jl., vol. 2, nos. 2 and 3, Feb. and March 1918, pp. 38-39 and 57-58. Made of cobalt and chromium. It is said to resist oxidation or tarnishing better than any metal excepting gold and metals of platinum groups, specially when chromium content is over 15 per cent.

Stress Lines in Steel

Stress Lines in Steel after Permanent Deformation, Andrew McCance. Sci. Am. Supp., vol. 88, no. 2282, Sept. 27, 1919, pp. 196-197, 15 figs. Study of hardening at various distances from the point altered by hammering, punching or shearing. From Trans. Instn. Engrs. & Shipbuilders, Scotland.

Tubing

Manufacture and Properties of Light-Wall Structural Tubing, H. J. French. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1855-1874, 4 figs. Including tables showing physical properties of low-carbon seamless tubes, effect of varying cold reduction in outside diameter on seamless steel tubing, effect of low-temperature annealing on properties of low-carbon cold drawn seamless steel tubes, effect of furnace temperature variation in final annealing on properties on low-carbon seamless steel tubing, and properties of hard-drawn and partly annealed 0.3 to 0.4 per cent carbon seamless steel tubes and of cold-drawn 3½ per cent nickel-steel seamless tubing under varying thermal treatment.

Tungsten Steel

On some physical Constants of Tungsten Steels, Kotaro Honda and Tokujiro Matsushita. Sci. Reports of Tohoku Imperial University, vol. 8, no. 2, Aug. 1919, pp. 89-98, 7 figs. Experiments with specimens containing different percentages of tungsten, contents of carbon being 0.3 per cent in one series and 0.6 per cent in another.

Work, Effect on Metals

The Effect of Work on Metals and Alloys, Owen Wm. Ellis. Engineering, vol. 108, no. 2800, Aug. 29, 1919, pp. 290-292, 13 figs. Results of research work of investigators into effect of cold work on mechanical properties of metals and alloys are collated, and evidences are noted of existence of points of inversion in graphs connecting percentage reduction by work and mechanical properties of certain metals and alloys, for example, steel, brass, copper, etc. Hypothesis that for every temperature there exists a critical range of deformation at which recrystallization of amorphous material accruing as result of cold work is extremely rapid is discussed. Paper read before Inst. of Metals.

MEASUREMENTS AND MEASURING APPARATUS

Angle Measurement

Some New Johansson Measuring Appliances, Automotive Industries, vol. 41, no. 13, Sept. 25, 1919, pp. 611-612, 3 figs. One of the sets is said to be for the measurement of angles to a degree never before attempted.

Comparator, Wilson Projection

Some Optical Aids for the Engineer—IV, Arthur C. Banfield. Machy. (Lond.), vol. 14, no. 364, Sept. 18, 1919, pp. 737-740, 10 figs. Description of Wilson projection comparator. Operator avoids distortion by special twin optical system of such a nature that respective optical centers are adjustable to diameter of screw under test.

Johansson Apparatus

See Angle Measurement.

Meters, Venturi

Computation of the Coefficient of Discharge of Venturi Meters, W. S. Pardoe. Eng. News-Rec., vol. 83, no. 13, Sept. 25, 1919, pp. 606-608, 6 figs. Tests at University of Pa. said to have indicated that coefficients may be computed within 0.5 per cent of experimental values.

Pyrometers

Pyrometer Protection Tubes, Otis Hutchins. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1811-1816, 3 figs. Experiments to determine effectiveness of protection appliances used for high-temperature pyrometer insulations involving use of platinum couples, and outline of characteristics of carborundum protection tube.

Self-checking Galvanometer Pyrometer, H. F. Porter. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1803-1805, 2 figs. Galvanometer circuit so arranged that by means of simple adjustment resistance of entire circuit is rendered equal to constant predetermined value, as substitute of continuously deflecting pyrovolter.

Resistance Thermometry, F. W. Robinson. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1829-1836, 1 fig. Advantages of electric resistance method, its limitations; construction and protection of resistance spirals; types of measuring apparatus; and table giving resistance values for quartz-resistance thermometers.

Alloys Suitable for Thermocouples and Base-metal Thermoelectric Practice, J. M. Lohr. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1837-1843, 2 figs. Development of "chromel" and "alumel." Also notes on methods of controlling temperature at cold end and diagrams for installing thermocouple extensions.

Application of Pyrometry to Problems of Lamp Design and Performance, I. H. Van Horn. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2271-2300, 7 figs. In studying temperature description in vacuum lamp and in gas-filled lamp, gas loss for coil filament in gas-filled lamp, and measuring filament temperature.

Report of Pyrometer Committee of National Research Council, George K. Burgess. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2271-2300, 7 figs. Committee was formed Sept. 20, 1919, for purpose of developing pyrometric method suitable for open-hearth steel practice so that effects of temperature in various stages of process of steel making might be correlated quantitatively with other factors influencing production of sound steel. It is reported that use of Acheson graphite, either in block or tube form, as target after immersion to desired depth and location in metal bath and sighted upon by optical pyrometer, was found in experiments to be serviceable method of temperature control.

Recent Improvements in Pyrometry, R. P. Brown. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1979-1994, 5 figs. Improvements in applications of pyrometers to industry. Writer observes that while certain foreign countries were formally recognized as leaders in manufacture of scientific instruments and particularly pyrometers, this lead has now been taken by United States.

Automatic Compensation for Cold-Junction Temperatures of Thermocouple Pyrometers, Felix Wunsch. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 2065-2071, 7 figs. Illustrating various systems of automatic compensation, notably by carbon discs, by nickel and manganin coils and method used in Leeds and Northrup split-circuit potentiometer system.

Teaching Pyrometry in Our Technical Schools, George V. Wendell. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 2097-2106. Mere acquaintance with constructional details of pyrometers and their operations is not considered sufficient for intelligent application of pyrometers to scientific and industrial measurement of temperature. It is suggested that a course in pyrometry should rather lay such a sound foundation that any subsequent heat problem can be attacked with confidence and good judgment.

The "Wedge" optical Pyrometer. Engineer, vol. 128, no. 3323, Sept. 5, 1919, pp. 229-230, 3 figs. Instrument consists of rectangular brass tube across which, at right angles, there is fitted a small telescope.

Tables and Curves for Use in Measuring Temperatures with Thermocouples, Leason H. Adams. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 2111-2124, 6 figs. Calibration tables covering range zero to 1755 deg. cent. for platinum, platinrhodium couple, zero to 385 deg. cent. for copper-constantan and zero to 1283 deg. cent. for chromel-alumel. Curves show variation of thermoelectromotive force with temperature, sensitivity of couples at various temperatures and similar characteristics.

Fundamental Laws of Pyrometry, C. E. Mendenhall. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 2111-2124, 6 figs. Survey of physical basis of pyrometry.

Application of Pyrometry to the Manufacture of Gas-mask Carbon, Kirtland Marsh. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1611-1626, 7 figs. Pyrometry equipment at works of Astoria Light, Heat & Power Co., Astoria, N. Y., where gas-mask carbon was produced from cocoanut shells and fruit pits.

Recording Pyrometry, C. O. Fairchild and Paul D. Foote. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1627-1654, 22 figs. Pyrometers that can be made to record automatically are classified under (1) gas saturated vapor, and liquid thermometers, (2) resistance thermometers, (3) thermoelectric pyrometers, and (4) radiation pyrometers. Of these, thermoelectric pyrometers have greatest applicability. Various types of thermocouple recorders, some operating on galvanometric principle and some on potentiometric system, are described.

Recording Thermocouple Pyrometers, Leo Behr. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1655-1660, 5 figs. Device consisting of Wheatstone bridge network in series with thermocouple, one arm of bridge being of nickel and being located at cold end of thermocouple, described as permitting accurate automatic cold-junction compensation.

Pyrometry in Rotary Portland Cement Kilns, Leo I. Dana and C. O. Fairchild. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1661-1673, 1 fig. Measurements of temperatures in dry-process, coal-burning kiln, made by High-temperature Measurements Section of Bur. of Standards.

Some Factors Affecting the Usefulness of Base-Metal Thermocouples, O. L. Kowalke. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1751-1761, 7 figs. Factors considered are indicating and recording instruments, insulation on elements, constancy and homogeneity of wires and resistance to oxidation in furnace.

Potentiometers for Thermoelement Work, Walter P. White. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1763-1772, 3 figs. Methods of reading thermocouple pyrometers, specially by potentiometers and by intermediate instruments, such as pyrovolter.

Theory and Accuracy in Optical Pyrometry with Particular Reference to the Disappearing-Filament Type, W. E. Forsythe. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2547-2578, 10 figs. Including tables giving results obtained by experience of observers using different red glasses and different absorbing glasses, and also results of intercomparison temperature scales.

Thermoelectric Pyrometry, Paul D. Foote, T. R. Harrison and C. O. Fairchild. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2631-2686, 35 figs. Analytical presentation of physical phenomena underlying operation of indicating instruments, outline of their commercial forms, discussion of correction for irreproducibility of couples and comparative study of protection tubes for thermocouples.

Pyrometry in the Tool-manufacturing Industry, J. V. Emmons. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 15., Sept. 1919, pp. 2155-2158. Suggests establishing regular system of inspection and testing to safeguard unsatisfactory service from all types and makes of pyrometers.

Protecting Tubes for Thermocouples, R. B. Lincoln. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 2147-2150. Care taken in selection of proper tubes, locating it in most favorable place in furnace, and then inspecting and replacing it before it has deteriorated enough to injure couple, are suggested as means of increasing accuracy and decreasing up-keep charges.

A Reference Standard for Base-Metal Thermocouples, N. E. Bonn. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 2135-2137. It is concluded from investigation undertaken to determine third metal against which iron and constantan might be checked, that copper is ideal standard for checking of base-metal thermoelements, because it can be easily obtained in electrolytic form, in which it has same thermoelectric properties regardless of its origin.

Shadow Measurement

New Method of Measuring Shadows (Ein neuer Weg zur Messung von Schatten), Konrad Norden. Journal für Gasbeleuchtung, vol. 62, no. 30, July 26, 1919, pp. 416-420, 3 figs. Calculation and valuation of shadows in lighting installations.

Scale Testing

The Personal Equation in Testing Scales, Scale Jl., vol. 6, no. 1, Oct. 10, 1919, p. 7, 2 figs. Diagrams indicating how a person can be influenced by convenience and prejudice in coming to a decision while making measurements or carrying out tests.

Temperature Control

High-Temperature Control, C. O. Fairchild and Paul D. Foote. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1701-1715, 9 figs. Relation of temperature variations to other factors involved in control of furnace, kilns, ovens, tanks, etc., operated at high temperatures is discussed and brief description given of devices used in high-temperature control.

Temperature Measurements

Temperature Measurements of Incandescent Gas Mantles, Herbert E. Ives. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1681-1686, 3 figs. Comparative study of measurements effected by three methods—optical, total radiation, and by thermocouples. Of these, the last method was found to be most accurate.

See also Pyrometry.

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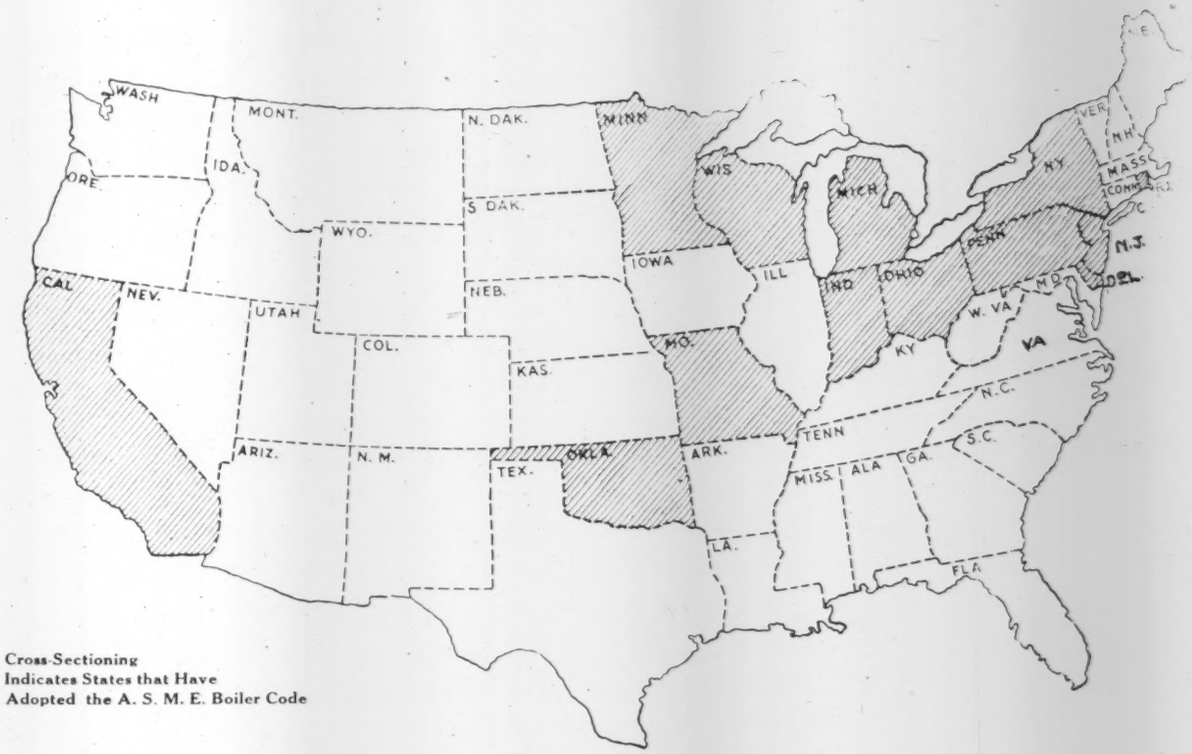

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Temperature Scale

Standard Scale of Temperature, C. W. Waidner, E. F. Mueller and Paul D. Foote. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 2051-2063. Outline of proposed international scale of temperatures in interval from — 40 per cent to 1100 per cent; also account of work done and data obtained to devise uniform scale above 1100 per cent.

High-Temperature Scale and its Application in the Measurement of True, Brightness, and Color Temperatures. Edward P. Hyde. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1969-1974. Discussion of Boltzman's and of Planck's equations.

Thermometers

High-temperature Thermometers. R. M. Wilhelm. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1687-1700, 5 figs. Industrial forms of high-temperature mercurial thermometers and indicating and recording thermometers of vapor-pressure, liquid or gas-filled, and bimetallic or graphite-metal expansion tubes.

Vacuum Gage

A Simple Theory of the Knudsen Vacuum Gauge. George W. Todd. Lond., Edinburgh, and Dublin Phil. Mag., vol. 38, no. 225, Sept. 1919, pp. 381-382. Expression of pressure in terms of constants of instruments.

Vapor-Pressure Estimation

Improved Apparatus for the Estimation of Vapor Pressures. Allan Morton. Chem. Indus., vol. 38, no. 19, Oct. 15, 1919, pp. 363t-364t, 1 fig. Apparatus in which taps of ordinary type have been eliminated.

MECHANICS

Balancing of Rotating Parts

Dynamic Balancing of Quickly rotating Machine Parts (Ueber die dynamische Auswuchtung von rasch umlaufenden Maschinenteilen). Hans Heyman. Elektrotechnische Zeitschrift, vol. 40, nos. 21, 22 and 23, May 22 and 29, and June 5, 1919, pp. 234-237, 251-254 and 263-265, 59 figs. Discussing Norton, Akimoff and Heyman methods. Progressive balancing method of writer was illustrated on a machine built by Schenk, Darmstadt, built in six sizes, making as high as 20,000 r.p.m., at which figure recording takes place by means of optical mirror apparatus. (Concluded.) Paper read before Elektratechnischer Verein, Berlin.

Beams

New Formulæ for the Economical Design of Rectangular Beams Particularly as Regards Shear Resistance. John C. Gammon. Indian Eng., vol. 66, no. 10, Sept. 6, 1919, pp. 137-138. Condition for no-shear reinforcement in a slab.

Determination of Secondary Stresses in Level Truss Constructions with Rigid Joints (Zeichnerisches Verfahren zur Ermittlung der Nebenspannungen des ebenen steifknotigen Fachwerkes). Chr. Vlachos. Eisenbau, vol. 10, no. 1, Jan. 1919, pp. 2-10, 11 figs. Discussing elastic funicular polygons of continuous beams, determination of change of angles and moment of support. Curves and formulæ.

Contribution to the Study of the Vierendeel Beam (Contribution à l'étude de la poutre Vierendeel). F. Keelhoff. Annales de l'Association des Ingénieurs de Gand, vol. 7, no. 5, 1914, pp. 431-448. Determining lines of influence by means of Maxwell theorem relative to reciprocity of deformations.

Engine Columns

The Design of Engine Columns—IV. W. K. Wilson. Mech. World, vol. 66, no. 1708, Sept. 26, 1919, p. 150, 2 figs. Method of stiffening columns by webplates. (Concluded.)

Mechanisms

The Design of Small Machinery. W. E. Thompson. Machy. (Lond.), Oct. 16, 1919, pp. 76-80, 7 figs. Qualifications necessary for single purpose machines, with notes on selection of bearing materials. Details of such mechanisms as hoppers for screw-slot machines and some special machines are taken up.

Motion

A Time-Scale independent of Space Measurement. Parabolic and Hyperbolic Kinematics. L. Silberstein. Lond., Edinburgh, and Dublin Phil. Mag., vol. 38, no. 225, Sept. 1919, pp. 382-394, 3 figs. Based principally on assumption that among all possible motions leading from one world point to another there is one and only one uniform motion.

Resistance of Materials

Application of Principle of Mechanical Similitude to Structures (Applicazioni del principio di similitudine meccanica alle costruzioni). Annali d'Ingegneria e d'Architettura, vol. 34, no. 15, Aug. 1919, pp. 228-235. Formula and calculations for determining resistance of material.

Shafts, Critical Speed

Critical Speeds of Torsion Shafts (Kritische Drehzahlen von Torsionswellen). H. Lorenz. Zeitschrift für das gesamte Turbinenwesen, vol. 16, no. 16, June 10, 1919, pp. 149-153, 4 figs. Shaft with one gyrating mass; shaft with several gyrating masses.

Shafts, Whirling of

The Whirling of a Coplanar Crankshaft. J. Morris. Aeronautics, vol. 17, no. 308, Sept. 11, 1919, pp. 258-259, 3 figs. Applies alternative method to cover cases of two-cranked and four-cranked coplanar crankshafts and shows further that same method is applicable to case of crankshaft having any number of coplanar cranks.

Vibrations

Shaking Motion in Coupling Rod Gear (Ueber die Schüttelschwingungen des Kuppelstangenantriebes). Karl E. Müller. Schweizerische Bauzeitung, vol. 74, nos. 12, 13 and 14, Sept. 20, 27 and Oct. 4, 1919, pp. 141-144, 155-158, and 169-172, 14 figs. Deduction of differential equation; calculation of instability area; resonance vibrations; course of rod power in rigid shafts; description of experimental arrangement of apparatus. (Concluded.)

MECHANICAL PROCESSES

Ball Bearings

The Manufacture of Ball Bearings. Automobile Engr., vol. 9, no. 130, Sept. 1919, pp. 305-310, 25 figs. Describing works and equipment of Rudge-Whitworth, Ltd., Birmingham, Eng.

Belting, Rubber

Details of the Manufacture of Rubber Belting. Belting, vol. 15, no. 8, Oct. 20, 1919, pp. 26-27, 4 figs. How crude rubber is gathered, prepared for market, then processed and united with cotton duck in the belting factory.

Blooming Mills

New Davy Brothers Blooming Mills (Nouveaux trains de laminoirs blooming système Davy Brothers). Génie Civil, vol. 75, no. 1936, Sept. 20, 1919, pp. 261-263, 6 figs. At steel works of Bolckow, Vaughan and Co., Middlesbrough (Cleveland), England. Blooming mills have cylinders of 40 in. in diameter. Works will turn out rails and large beams of various sections.

Crushing Plants

Crushed-Stone Plant without Conveyors. Rock Products, vol. 22, no. 19, Sept. 13, 1919, pp. 36-42, 24 figs. Details of Laurin & Leitch Eng. & Construction Co.'s plant near Montreal. Material is elevated once and for all and no rehandling is said to be necessary.

Coal Crushing in a By-Product Coke Oven Plant. Gas Age, vol. 44, no. 8, Oct. 15, 1919, pp. 337-339, 4 figs. Notes on possibilities of coke ovens and use of crushers.

Engines, Marine

Construction of Marine Engines at the Joshua Hendy Iron Works' Plant. H. L. Rexworthy. Pac. Mar. Rev., vol. 16, no. 10, Oct. 1919, pp. 133-134. Engines are of 2800 hp. and of triple-expansion reciprocating type.

Extrusion of Metals

The Extrusion of Metals. J. H. Garnett. Machy. (Lond.), vol. 15, no. 367, Oct. 9, 1919, pp. 43-48, 10 figs. Methods by which process is carried out and description of various presses.

Sanding Machine

Building a Sanding Machine. Machy. (Lond.), vol. 14, no. 363, Sept. 11, 1919, pp. 721-724, 15 figs. Article deals with methods of machining important parts and describes jigs and fixtures used and general procedure in building machines.

Screening

Sand and Gravel Plant Has Concrete Screening Tower and Buildings. Rock Products, vol. 22, no. 21, Oct. 11, 1919, pp. 37-41, 14 figs. Sand and gravel is removed from 40-ft. bank by 2½-cu. yd. bottom-dump cars. Screens are mounted in batteries of twos so that half the gravel goes through each.

MOTOR-CAR ENGINEERING

Caterpillar Tractors

Caterpillars and Their Construction—I. K. H. Condit. Am. Mach., vol. 51, no. 13, Sept. 25, 1919, pp. 601-604, 5 figs. Types built by Holt Mfg. Co., Peoria, Ill.

Diesel Engine

The Diesel Engine and Automobiles. Charles Day. Practical Engr., vol. 60, no. 1703, Oct. 16, 1919, pp. 185-188, 6 figs. Modifications which will be necessary to introduce in present design of Diesel engine to make it applicable to automobile work, particularly in regard to spraying of fuel into cylinders, range of speed, and production of turbulent conditions of gases at time of ignition. Paper read before Inst. Automobile Engrs.

Gas Storage

High-Pressure Gas Storage for Motor Vehicles. Engineering, vol. 108, no. 2799, Aug. 22, 1919, pp. 248-249. Discussion of views contained in report of Inter-Departmental Committee on Gas Traction in regard to manufacture of containers for compressed gas.

Heavy Fuels

Heavy-Fuel Carbureter Type Engines for Vehicles. J. H. Hunt. Jl. Soc. Automotive Engrs., vol. 5, no. 3, Sept. 1919, pp. 202-207, 5 figs. Survey of experiments reported in various technical papers interpreted to indicate that "there is no demonstrated means by which the heavy fuel carburetor engine will improve the fuel situation to any great extent," because "equipments which have shown promising results in service have handled nothing heavier than kerosene."

Impact Tests of Trucks on Roads

Preliminary Report of Impact Tests of Auto Trucks on Roads. E. B. Smith. Public Roads, U. S. Dept. Agriculture, Bur. Public Roads, vol. 2, no. 15, July 1919, pp. 8-10, 3 figs. Also Eng. & Contracting, vol. 52, no. 14, Oct. 1, 1919, pp. 390-392, 3 figs. Apparatus used consisted of heavy steel cylinder in which was fitted plunger 4 in. in diameter and 8 in. long, similar in construction to hydraulic jack. Results indicated general tendency increased impact toward higher speed, although increment of increase was less as speed increased.

Truck Weights

The Economic Limit to Motor-Truck Weights. Robert C. Barnett. Eng. & Contracting, vol. 52, no. 14, Oct. 1, 1919, pp. 374-380, 5 figs. Discussing relation between thickness of pavement and weight of truck, between weight of truck and its capacity, between cost of truck and its capacity. Cost of operation, economic speed and annual cost of transportation. Continuation of article published in E. & C., Jan. 1, 1919.

Valve-Spring Anchorage

Valve-Spring Anchorage. Autocar, vol. 43, no. 1247, Sept. 13, 1919, pp. 399-401, 6 figs. Critical review of various systems frequently adopted in current engine design.

PIPE

Joints

Making of Cement Joints for Cast Iron Pipe. W. M. Henderson. Gas Age, vol. 44, no. 8, Oct. 15, 1919, pp. 343-344, 2 figs. Experience with these joints at Pacific coast. Paper read before Pacific Coast Gas Assn.

Pipe Line

The Yarhola Pipe Line. Wynn Meredith. Eng. World, vol. 15, no. 8, Oct. 15, 1919, pp. 37-43, 12 figs. With notes on field transportation problems which involved 720,000 ton-miles of haul.

POWER GENERATION

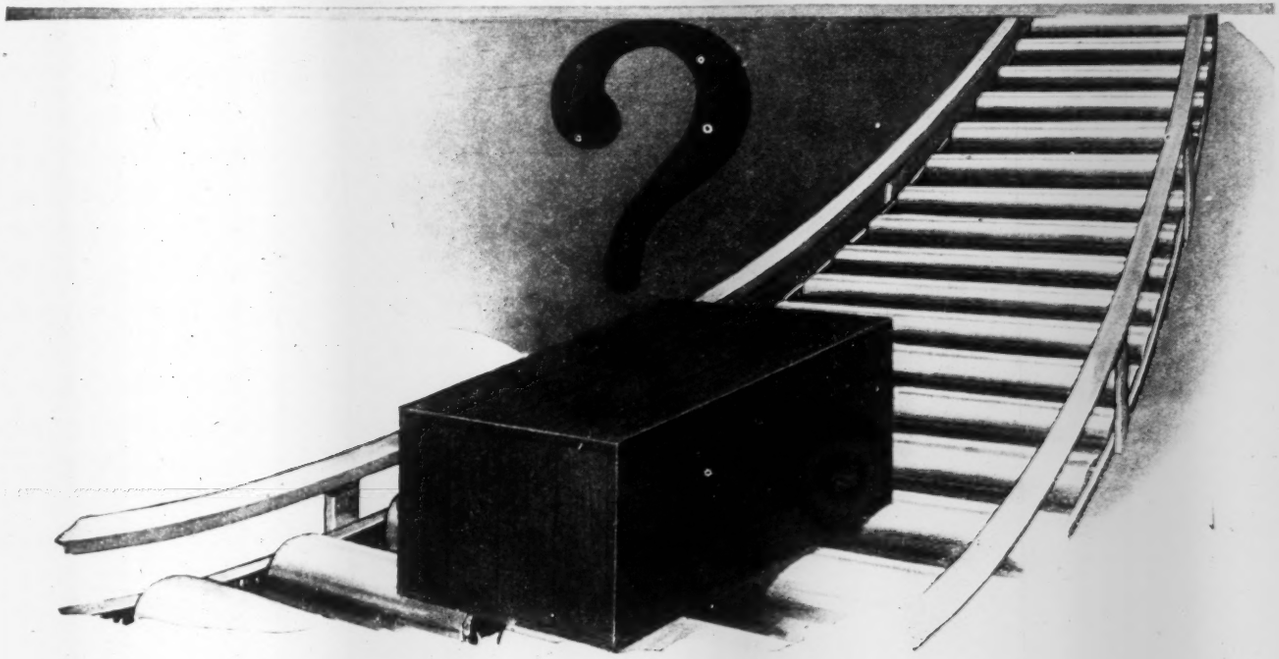
Blast-Furnace Gases

Utilization of Blast-Furnace Gases and of Low-Grade Fuels (Utilisation des gaz de hauts fourneaux et de charbons maigres). P. Moutier. Electricien, vol. 49, no. 1233, July 31, 1919, pp. 42-44. Utilization of gases from blast furnaces considered as important of being developed as utilization of hydraulic energy.

Tidal Power

Proposed Tidal Hydro-Electric Power Development of the Petitcodiac and Memramcook Rivers. Jl. Eng. Inst. Can., vol. 11, no. 10, Oct. 1919, pp. 647-658, 8 figs. Also Can. Engr., vol. 37, no. 15, Oct. 9, 1919, pp. 362-366 and pp. 372-374, 7 figs. Dams and power house at confluence of Petitcodiac and Memramcook Rivers. Initial installation of 90,000 hp. would cost, it is said, about $122 per hp.

Lamson Conveyors



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LAMSON SERVICE

Winnipeg

Low-Cost Hydro Power in Winnipeg. Power House, vol. 12, no. 14, Sept. 5, 1919, pp. 381-384, 7 figs. General layout of plant having output of 45,000 hp. generated at 60,000 volts and sent over 65-mile duplicate line which is supported on standard steel towers, 40 ft. high and placed at 500-ft. intervals.

POWER PLANTS

Boiler Explosion

A Boiler Explosion in a Creamery. Power House, vol. 12, no. 16, Oct. 6, 1919, pp. 438-439, 3 figs. Low water and dynamite are conjectured as causes for accident.

Boiler House

Methods of Increasing Boiler-Room Efficiency, D. S. Jacobus. Boiler Maker, vol. 19, no. 8, Aug. 1919, pp. 239-242. Discussion of effect of stoker and furnace on boiler operation with remarks on burner system and comparative study of gas engines and steam installations.

Economy in the Power House, George Frederick Zimmer. Eng. & Indus. Management, vol. 2, no. 12, Sept. 18, 1919, pp. 355-357, 2 figs. Efficient utilization of coal advocated and to minimize waste and increase productiveness writer advises careful handling of coal from colliery to furnace door and scientific burning in grate.

Coal and Ash Handling

Equipment for Handling Coal and Ashes in Power Plants—II, Robert June. Elec. Rev., vol. 75, no. 17, Oct. 25, 1919, pp. 691-692, 1 fig. Influence of methods upon plant operation.

Condensers

The Design of Surface Condensers. Mech. World, vol. 66, no. 1706, Sept. 12, 1919, pp. 124-125. With special reference to Prof. Whitham's formula.

Contraflow System of Utilizing Exhaust

The Contraflo System of Utilizating Exhaust. Power House, vol. 12, no. 15, Sept. 20, 1919, pp. 417-419, 4 figs. It is claimed that by means of this arrangement all heat of the exhaust steam from engine-room auxiliaries is made available and less of heat in main engine exhaust is rejected.

Feedwater Heating

Feed Water Heating, A. R. Hodges. Boiler Maker, vol. 19, no. 9, Sept. 1919, pp. 274-276, 1 fig. Description of heater construction and notes on fuel saved by use of properly designed feedwater heater.

Steam, Superheated, Uses

Industrial Uses of Superheated Steam, Alexander Bradley. Blast Furnace & Steel Plant, vol. 7, no. 10, Oct. 1919, pp. 519-522, 5 figs. Tests made by U. S. Steel Corporation on blowing engines said to have indicated average saving of 13.33 per cent.

POWER TRANSMISSION

Belt Transmission

Belt Economy (Rationel Remdrift), Harald Holstein. Teknisk Tidsskrift, vol. 43, no. 33, Aug. 20, 1919, pp. 116-134, 26 figs. Design and calculation of pulleys and belting; belt coupling; graphs.

Problem of Belt-Edge Tear and How to Solve It. Belting, vol. 15, no. 8, Oct. 20, 1919, pp. 17-19, 4 figs. Improper alignment of pulleys believed to be principal cause.

Gearing, Reduction

Gearing as applied to the Marine Steam Turbine, John Houston. Trans. Inst. Mar. Engrs., vol. 31, no. 246. Sept. 1919, pp. 363-387, 4 figs. Design, workmanship and materials of helical spur wheel reduction gear.

PRODUCER GAS

Gas-Producer Practice

Gas-producer Practice at Western Zinc Plants, G. S. Brooks and C. C. Nitchie. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2721-2773, 35 figs. Illustrating details in process of classifying Ill., Ind. and Kan. coals. Among devices noted are Chapman floating agitator installed on remodeled Duff gas producer at roast kilns and various particulars of Hughes gas producer.

Producer-Gas Investigation

Résumé of Producer Gas Investigations, Oct. 1, 1904-June 30, 1910, R. H. Fernald and C. D. Smith. Dept. Interior, Bur. Mines, Bul. 13, 1911, 393 pp., 250 figs. Tests reported were of two classes: (1) made with pressure-producer installation, and (2) made with down-draft producer plant. Efficiencies obtained are interpreted as showing possibility of gas producer as factor in reducing waste in use of coal and lignites and preserving fuel resources of U. S. A.

Sulphur in Producer Gas

Sulfur in Producer Gas, Frederick Crabtree and A. R. Powell. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2687-2692. Method for estimation of carbon bisulphide constituent of commercial gas.

PUMPS

Anthony Steam Pump

"Anthony" Patent Steam Pump. Steamship, vol. 31, no. 364, Oct. 1919, pp. 93-96, 4 figs. Steam distribution gear is mechanically operated, and all working parts are embodied in one complete unit.

Bunsen Aspirating Pump

The Bunsen Aspirating Pump and the Bernouilli Principle, Will C. Baker. Phys. Rev., vol. 14, no. 3, Sept. 1919, pp. 228-233, 3 figs. Usually given application of Bernouilli theorem to Bunsen aspirating pump is shown to be fallacious. Experiments are described that show this pump to be an impact pump.

Pump Selection

Considerations Affecting the Choice of Pumps for Small Water Works, Henry A. Symonds. Mun. & County Eng., vol. 54, no. 4, Oct. 1919, pp. 178-180. Particularly as determined by comparative fuel and first costs of various types.

Pumps, Multi-Stage

Methods of Lifting Sulphuric Acid, Sidney J. Tungay. Chem. Age, vol. 1, no. 12, Sept. 6, 1919, pp. 326-328, 2 figs. Writer traces progress made and describes multi-stage pumps which appear to have solved problem.

REFRACTORIES

Clay

Tests to Determine Uses for Clay, R. F. MacMichael. Brick & Clay Rec., vol. 55, no. 9, Oct. 21, 1919, pp. 762-767, 11 figs. Forms used for recording physical characteristics of clays, methods of testing them in laboratory and examples of curves and data obtained.

Melting Points

Melting Point of Refractory Materials, Leo I. Dana. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1571-1586, 1 fig. Factors and conditions that effect values of melting points and outline of methods for their determination.

Porcelain for Pyrometers

Porcelain for Pyrometric Purposes, Frank H. Riddle. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 2207-2217, 3 figs. Comparative study of various kinds of porcelain protecting tubes and notes on their manufacture.

Pyrometer Porcelains and Refractories, R. W. Newcomb. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1975-1977. Concerning selection of protecting tubes.

Pyrometry

Application of Pyrometers to Ceramic Industry, John P. Goheen. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2255-2264, 3 figs. Specially as continuous guide for burning of kilns from start until kiln is finally burned off.

Temperature Measurements

Refractory Materials and High-Temperature Measurements, C. W. Kanolt. Jl. Franklin Inst., vol. 188, no. 4, Oct. 1919, pp. 489-505. Notes on uses of thermocouples, resistance thermometers, optical and radiation pyrometers and pyrometric cones.

REFRIGERATION

Carbonic Anhydride Machine

The Carbonic Anhydride Refrigerating Machine, Peter Neff. A.S.R.E. Jl., vol. 5, no. 4, Jan. 1919, pp. 266-269 and (discussion) pp. 269-271. Conditions existing with regard to this type of apparatus in United States.

Clothel Refrigerating Machine

Test of Two-Ton Clothel Refrigerating Machine, M. C. Stuart. Jl. Am. Soc. Naval Engrs., vol. 31, no. 3, Aug. 1919, pp. 624-634, 6 figs. Refrigerant used was Ethyl-Chloride. Results showed that refrigerating effect was increased with higher brine temperatures and lower circulating water temperatures; with circulating water temperature of 70.1 deg. fahr. net refrigerating effect was 2.13 tons per day.

Gas Warfare

Refrigeration in Connection with Gas Warfare, A. M. Heritage. Am. Soc. Refrig. Engrs. Jl., vol. 5, no. 6, May 1919, pp. 403-415, 14 figs. Methods used, particularly in connection with transfer of phosgene from drums into system for filling shells and other projectiles.

Industrial Applications

Industrial Applications of Refrigeration, Charles L. Hubbard. Indus. Management, vol. 58, no. 4, Oct. 1919, pp. 289-294, 13 figs. Illustrating such applications as are employed for preservation of food, cooling of drinking water, control of certain chemical reactions, cooling workrooms, manufacturing confections and many others.

Machinery Arrangement

Machinery and Pipe Arrangement—XXIII, C. C. Pounder, Mech. World, vol. 66, no. 1711, Oct. 17, 1919, p. 186, 5 figs. In refrigerating plant. (Continuation of serial.)

Plant Efficiency

Refrigerating Plant Efficiency, George Naylor. Power House, vol. 12, no. 15, Sept. 20, 1919, pp. 420-421. Significance of correct proportioning for securing maximum operating plant economy.

Railroad Car Precooling

Precooling Loaded Refrigerator Cars. Ice & Refrigeration, vol. 57, no. 4, Oct. 1919, pp. 133-140, 5 figs. Commercial aspect of railroad car precooling studied from records of actual operation.

Storage, Cold, Plant

British Design for small Cold Storage. Ice & Refrigeration, vol. 57, no. 4, Oct. 1919, pp. 144-146, 6 figs. Sketch design for warehouse of about 120 tons capacity which can be constructed for approximately $40,000 exclusive of cost of land.

Improved Cold-Storage Methods a Means to Better World Provisioning, F. E. Matthews. Am. Soc. Refrig. Engrs. Jl., vol. 5, no. 6, May 1919, pp. 416-426 and (discussion) pp. 426-433. Extension and improvement of cold storage emphasized by statements in U. S. Government reports that 15 per cent of all food stuffs grown in this country is wasted before it reaches market, and that 25 per cent of amount reaching market is wasted before it reaches consumer.

Synchronous Motors

Synchronous Motors for Refrigerating Compressor Operation. Power Plant Eng., vol. 23, no. 21, Nov. 1, 1919, pp. 992-993, 2 figs. Installation of Brooklyn ice plant which consists of six 15 x 15 in. compressors driven in sets of 2 x 3 350-hp. direct-connected synchronous motors.

RESEARCH

Agriculture

Problems and Methods in Agricultural Research, H. J. Wheeler. Jl. Indus. & Eng. Chem., vol. 11, no. 11, Nov. 1, 1919, pp. 1056-1060. Warns against types of work from which false and misleading conclusions have been drawn.

Chemical Engineers, Canada

The Value of Scientific Work and the Training of Chemical Engineers in Canada. Can. Chemical Jl., vol. 111, no. 10, Oct. 1919, pp. 335-340. From report of proceedings of Chemistry Committee of Honorary Advisory Research Council.

Foundries and Machine Shops

The Necessity and Advantages of a Laboratory in Foundries and Machine Shops (Gesichtspunkte über die Notwendigkeit und den Nutzen eines Laboratoriums für eine Giesserei und Maschinenfabrik), Fr. Meese. Giesserei-Zeitung, vol. 16, no. 14, July 15, 1919, pp. 209-214, 6 figs. One of advantages claimed is that by determining injurious factors it is possible to reduce inferior or rejected grades to minimum. Photomicrographs.

Minerals, Non-Metallic

Non-metallic Mineral Research. Cement, Mill & Quarry, vol. 15, no. 8, Oct. 20, 1919, pp. 27-31. Observes that war work of Bureau of Mines provides foundation for valuable development of industrial minerals if properly encouraged by cement, mill and quarry industries.

Organization and Equipment

Industrial and electrical Laboratories (Les laboratoires d'usines et d'électricité industrielle), G. Lebaupin. Electricité, vol. 49, no. 1232, July 15, 1919, pp. 8-13, 4 figs. Suggestions in regard to organization and selection of equipment.

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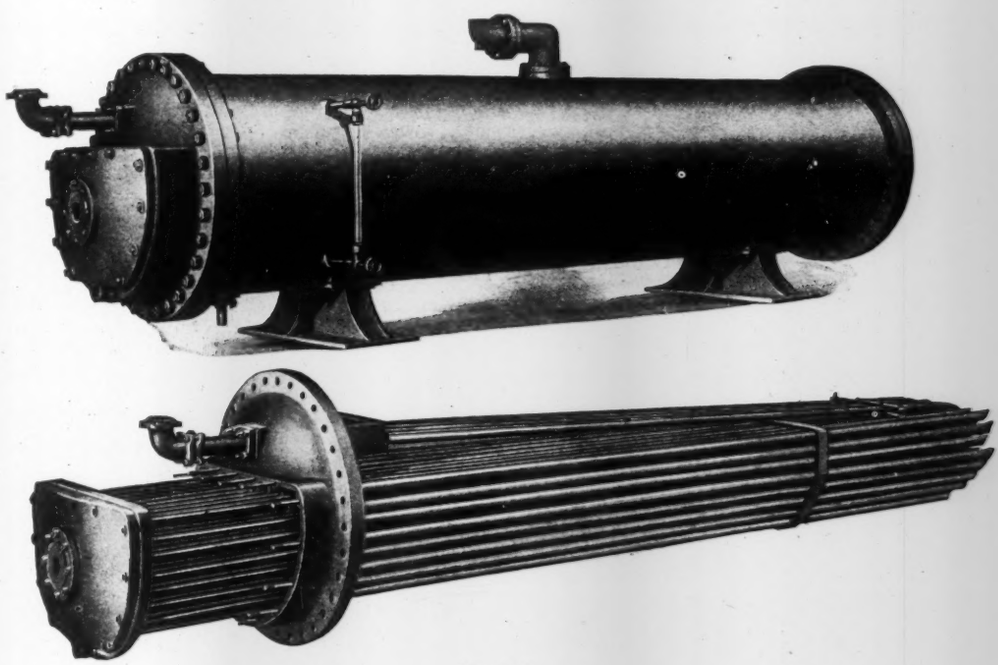

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SPECIFICATIONS

Creosote Oil

Specifications for Creosote Oil. Bul. Am. Ry. Eng. Assn., vol. 21, no. 217, July 1919, pp. 30-40, 12 figs. Including precautions to be followed in purchase and use of creosote-coal-tar solutions. Adopted by Association on recommendation of one of its committees.

Steel

Standard Specifications for Steel. Times Eng. Supp., vol. 15, no. 540, Oct. 1919, pp. 301-302. Their possibilities and uses.

Specifications for High-Speed Steels. R. Poliakoff. Mech. World, vol. 66, no. 1706, Sept. 12, 1919, pp. 128-129. Description of test tools and discussion of European practice and test factors.

STANDARDS AND STANDARDIZATION

Concrete-Reinforcement Bars

Concrete Reinforcement Bars rolled from Billets. Assn. Am. Steel Manufacturers pamphlet, Mar. 22, 1910. Standard specifications revised 1912 and Apr. 21, 1914.

Economical Results of Standardization

Engineering Standardisation. Gerald Lightfoot. Commonwealth Australia Inst. Sci. & Industry, Pamphlet no. 2, 1919, 30 pp., 1 fig. Economical results of standardization work carried out in England, America and Japan quoted as argument for convenience of introducing engineering standardization in Australian industry.

STEAM ENGINEERING

Boiler Explosions

Boiler Explosions, F. Carruthers. Mar. Engr. & Naval Architects, vol. 42, no. 505, Oct. 1919, pp. 81-82, 2 figs. Explosion of multitubular marine type boiler in steel cargo steamer found from inquiry to have been caused by overheating of tube ends and combustion chamber plates, due to accumulation of scale on their surfaces on water side.

Feeding Water-Tube Boilers

The Feeding of Water Tube Boilers (Das Speisen von Wasserrohrkesseln). Zeitschrift des Bayerischen Revisionsvereins, vol. 23, no. 7, Apr. 15, 1919, pp. 49-51. The arrangement of the feed pipe and its relation to water circulation and safety of boilers.

Flues

Flues for Internally-Fired Boilers—II, W. H. Grantham. Mech. World, vol. 66, no. 1708, Sept. 26, 1919, p. 151, 5 figs. British Board of Trade formula for computing working pressure for flues having sections connected together by joints. (Continuation of serial.)

Hochwald Piston Valve

See Piston Valves.

Piston Valves

Steam Engines with Shaft Governor and Piston Valve with automatic Compression Control (Dampfmaschinen mit Achsregler und Kolbenschieber mit selbsttätiger Regulierung der Verdichtung), M. Hochwald. Zeitschrift des Bayerischen Revisionsvereins, vol. 23, no. 7, Apr. 15, 1919, pp. 52-53, 4 figs. Description of the Hochwald piston valve, which automatically controls compression under varying working and filling conditions.

Turbines

The Westinghouse-Rateau Reducing-Pressure Steam Turbine. Mech. World, vol. 66, no. 1709, Oct. 3, 1919, pp. 163-165, 4 figs. Designed to satisfy requirements of industrial concerns such as chemical works, textile works, sugar factories, which, besides needing supply of steam of comparatively low pressure for heating, boiling, and drying processes, also requires supply of electric power for general purposes.

TEXTILES

Yarn and Acids

The Action of Dilute Sulphuric Acid Solutions upon the Tensile Strength of Cotton Yarn, Walter A. Lawrence. Can. Chemical Jl., vol. 111, no. 10, Oct. 1919, pp. 329-331, 4 figs. Experimental investigation described as having shown that cotton fibres are sensitive to very dilute sulphuric acid solutions, specially when allowed to dry on fibre, the higher the temperature of solution containing inorganic acid, the higher being the temperature of drying cotton treated with such a solution.

THERMODYNAMICS

Gas Explosion Phenomena

The Effect of Carbon Dioxide when present in inflammable gaseous Mixtures on Explosion Phenomena, W. T. David. Engineering, vol. 108, no. 2801, Sept. 5, 1919, pp. 300-302, 6 figs. Pressure records obtained for explosions of following mixtures: (1) 20.7 per cent coal-gas, 26.3 per cent oxygen and 53 per cent CO_2; (2) 15 per cent coal-gas, 26.4 per cent oxygen and 58.6 per cent CO_2; (3) 15 per cent coal-gas, 19.7 per cent oxygen and 65.3 per cent CO_2.

Heat Transmission

Heat Transmission of Steam containing Air to Water (Die Wärmeübertragung von lufthaltigem Dampf an Wasser), L. Schneider. Zeitschrift des bayerischen Revisions-Vereins, vol. 23, no. 11, June 15, 1919, pp. 85-87, 2 figs. It is claimed that even small quantities of air in steam reduce heat transmission by 50 and even 75 per cent.

WELDING

Electric Welding

Direct and Alternating Current Welding, A. M. Candy. Blast Furnace & Steel Plant, vol. 7, no. 10, Oct. 1919, pp. 484-486, 4 figs. Schemes of connections.

Electric Welding: Its Theory, Practice, Application and Economics, H. S. Marquand. Elecn., vol. 83, no. 2157, Sept. 19, 1919, pp. 300-302, 7 figs. Description of various methods of preparing welds; illustrations of various kinds of work and discussion of economies effected by machine welding. (To be concluded.)

Electrodes, Chemical Composition

Effects of the Chemical Composition of Welding Electrodes, J. S. Orton. Am. Mach., vol. 51, no. 13, Sept. 25, 1919, pp. 625-626. Results of tests made by Welding Research Committee of Shipping Board.

Portable Welding Outfits

Arc Welding for the Commercial Welding Shops, Robert E. Kinkead. Welding Engr., vol. 4, no. 10, Oct. 1919, pp. 42-44, 4 figs. Illustrating various portable welding outfits.

Quasi-Arc Welding

Quasi-Arc Welding, L. B. Dickerson. Southern & Southwestern Ry. Club, vol. 15, no. 4, July 1919, pp. 6-29, 16 figs. Outline of scientific principles upon which electric welding depends.

Slot Cutting

Milling Machine versus Oxy-Acetylene Machine. Can. Machy., vol. 22, no. 14, Oct. 2, 1919, pp. 349-350, 2 figs. Descripton of work done by straight line cutting blowpipe in cutting slots in slip socket.

Soldering

Solder, Soldering Flux and Soldering, F. A. Kartak. Power Plant Eng., vol. 23, no. 21, Nov. 1, 1919, pp. 975-977, 2 figs. Solders and fluxes required for soft and hard soldering of various metals.

Tipping Device

Improved Tipping Device for Oxy-Acetylene Welding Table, J. T. Smoody. Eng. & Min. Jl., vol. 108, no. 13, Sept. 27, 1919, pp. 553-554, 1 fig. Advantages claimed are positive lock from worn gears and one-man adjustment of table.

Weld-Metal Analysis

Determination of Oxygen and Nitrogen in Electric Weld Metal, J. H. Paterson and H. Blair. Jl. Soc. Chem. Indus., vol. 38, no. 17, Sept. 15, 1919, pp. 328T-330T. Suggested method in which electrolytic hydrogen is passed through tower filled with soda-lime and wash bottle containing strong sulphuric acid and from thence is carried into silica tube filled with fine iron borings and heated to bright redness in tube furnace, where any trace of oxygen contained in gas is reduced to water.

WOOD

Fungi

Fungi, the Cause of Decomposition of Timber, P. H. Dudley. Bul. Am. Ry. Eng. Assn., vol. 21, no. 217, July 1919, pp. 49-63, 12 figs. Illustrating how antiseptic arrests decomposition of lumber and timber.

Jarrah

See Seasoning.

Pattern Making

Pattern Turning—II, Joseph A. Shelley. Machy. (Lond.), vol. 15, no. 366, Oct. 2, 1919, pp. 10-15, 17 figs. Equipment required and methods used in turning shoulders, fillets, small core-prints, cylindrical patterns and irregular forms.

Seasoning

On the Rapid Seasoning of Jarrah, Alfred Tomlinson. Engineering, vol. 108, nos. 2800 and 2801, Aug. 29 and Sept. 5, 1919, pp. 287-289 and 323-325, 13 figs. Illustrating forms of (1) progressive, and (2) compartment classes of kilns for drying timber. Results of experiments. (To be continued.) Paper read before Western Australia Instn. of Engrs.

VARIA

Diamond Polishing

Diamond Polishing. Times Eng. Supp., vol. 15, no. 540, Oct. 1919, p. 310. An industry for disabled soldiers.

Grindstone Manufacture

The Manufacture of the artificial Grindstone of Carborundum, Y. Nakazawa (in Japanese). Denki Gakkwai Zasshi, no. 374, Sept. 10, 1919.

Organization and Management

ACCOUNTING

Cost Accounting

Fundamentals of Uniform Cost Accounting System for the Concrete Pipe and Tile Industry, G. A. Schonlau. Cement & Eng. News, vol. 31, no. 10, Oct. 1919, pp. 24-26. A reliable system of cost and financial accounting should record, it is said, where every item of material and time and expense goes in making of product or in process of buying and selling goods.

Cost Keeping

See Office Routine.

Costs

Relationship of Items of Cost under Pre-war Conditions and To-day, F. W. Doolittle. Elec. Ry. Jl., vol. 54, no. 15, Oct. 11, 1919, pp. 9-11. Effect of higher cost of labor and materials of construction is analyzed and illustrated by example. Paper presented before Am. Elec. Ry. Assn.

Foundry

Handling Costs in a Steel Foundry, Clifford E. Lynn. Iron Trade Rev., vol. 65, no. 18, Oct. 30, 1919, pp. 1179-1180, 7 figs. Forms used in foundry cost keeping.

Mechanical Devices

Mechanical Devices in Railroad Accounting, S. O. Price. Ry. Rev., vol. 65, no. 17, Oct. 25, 1919, pp. 600-601, 3 figs. Cards used in classifying wages and for showing cost statement of additions and betterment work.

Office Routine

Cost Records for Cost-Plus-Fixed-Fee System, F. A. Wells. Contract Rec., vol. 33, no. 41, Oct. 8, 1919, pp. 944-947, 5 figs. Illustrating office routine of purchase order, invoices and vouchers.

Cost Keeping under Cost-Plus-Fixed-Fee Contracts, F. A. Wells. Eng. & Contracting, vol. 52, no. 16, Oct. 15, 1919, pp. 447-449, 6 figs. Illustrating purchase orders, invoices and vouchers.

Overhead

The Overhead Cost in Contracting, Dan Carey. Eng. & Contracting, vol. 52, no. 17, Oct. 22, 1919, pp. 463-465. Importance of correctly estimating overhead costs and suggestions in regard to figuring them.

Records

The Block-Number System. Machy. (Lond.), vol. 15, no. 366, Oct. 2, 1919, pp. 7-9, 3 figs. Illustrating various methods of keeping records.

EDUCATION

Engineering Colleges

Engineering Colleges and Administration, Ira N. Hollis. Eng. Education, vol. 10, no. 2, Oct. 1919, pp. 33-68. Recommends that time of teacher be occupied with administration as little as possible, and that national engineering societies coöperate with Society for Promotion of Engineering Education and with colleges themselves towards broadening out engineering education.

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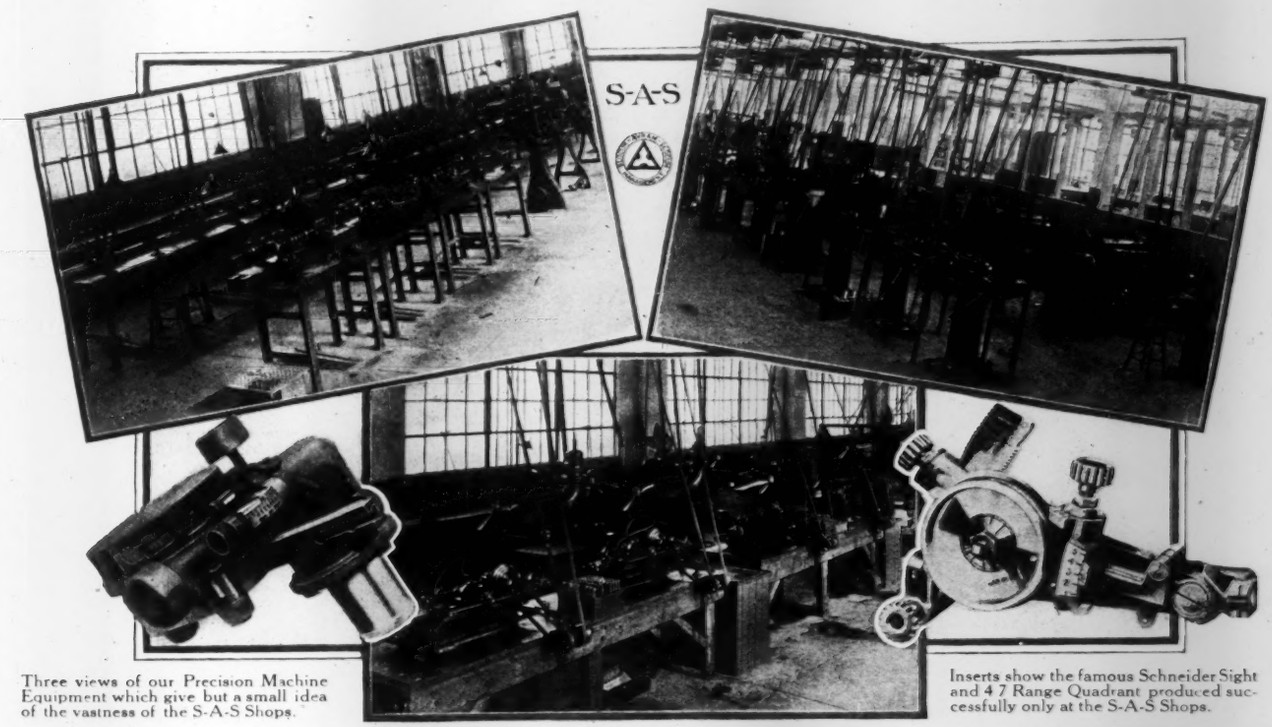

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EXPORT

Boilers

Foreign Demand for American Boilers, L. W. Alwyn-Schmidt. Boiler Maker, vol. 19, no. 9, Sept. 1919, pp. 271-272. Establishment of liberal foreign credit emphasized as necessary to open up extensive field for American boiler products.

Cement

International Trade in Cement. Cement, Mill & Quarry, vol. 15, nos. 6 and 8, Sept. 20 and Oct. 20, 1919, pp. 15-19 and 35-39. Statistics of imports into foreign countries; although figures mentioned were compiled from pre-war data, they may serve as basis to guide American manufacturers in computing and obtaining share of cement trade of the world. This article deals with imports into France, Germany and Mexico. Export opportunities in Spain, Portugal and South America are quoted.

FACTORY MANAGEMENT

Code Calling

Code Calling in Factories, V. Karapetoff. Indus. Management, vol. 58, no. 4, Oct. 1919, pp. 306-308, 1 fig. Points out advantages of electro-acoustic systems for increasing effectiveness of management and promoting good will among executives and employees.

Audible Signals in the Foundry, Vladimir Karapetoff. Iron Trade Rev., vol. 65, no. 14, Oct. 2, 1919, pp. 894-895, 2 figs. Suggested electrical calling mechanism. Paper presented before Am. Foundrymen's Assn.

Control Board

How I know where each Job stands, C. E. Fairbanks. Factory, vol. 23, no. 5, Nov. 1919, pp. 1036-1038, 1 fig. Chart mounted on control board warning of minimum stocks.

Employment

Placing the right Man in the right Job, W. D. Stearns. Machy. (N. Y.), vol. 26, no. 2, Oct. 1919, pp. 136-139, 4 figs. Methods used by Westinghouse Electric Manufacturing Co., East Pittsburgh, for analyzing jobs and classifying them with a view to obtaining standard wage rates. Second of two articles.

Foundries

System is a Factor in Production, W. C. Briggs. Foundry, vol. 47, no. 333, Oct. 15, 1919, pp. 735-737, 3 figs. Standardizing and classifying flasks and adopting plan based upon requirements of work as essentials in increasing output of foundry. Paper presented before Am. Foundrymen's Assn.

Graphic Control

Graphic Metallurgical Control, H. M. Merry. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2313-2321, 5 figs. Methods and records developed for use of executives of copper company in New Mexico. Particular attention is directed to use of large wall-charts, reference display of large charts, scale notation of metallurgical charts and inclusion of mesh extraction on screen-analysis diagrams.

Layout

New National Acme Screw Products Plant. Machy. (N. Y.), vol. 26, no. 2, Oct. 1919, pp. 120-122, 5 figs. Special attention is called to arrangement of plant which permits material to pass in one continuous stream through shop.

Laundry

The Factory Laundry. Eng. & Indus. Management, vol. 2, no. 16, Oct. 16, 1919, pp. 488-489, 3 figs. Details of establishment used in factory for washing overalls, caps, refectory table-cloths and lavatory towels.

Machine-Tool Plant

Organization and Management of a Machine Tool Plant—IV. Machy. (Lond.), vol. 14, no. 363, Sept. 11, 1919, pp. 714-716, 7 figs. Dealing with factory control, departmental efficiency records, progress reports, advertising department, employment department.

Production Manager

The Production Manager and the Progress Chief, W. J. Hiscox. Machy. (Lond.), vol. 14, no. 362, Sept. 4, 1919, pp. 693-694, 1 fig. Defining duties of both, viz., for one to get the work and the other to produce the article, writer claims that there are many firms who, although they accept the principle in connection with appointment of business manager and works manager, will not adopt it in connection with the factory organization.

Progress Chief

See Production Manager.

Repetition Work

Seek Economy in Repetition Work. Foundry, vol. 47, no. 18, Nov. 1, 1919, pp. 761-766, 13 figs. Arrangement of factory which manufactures parts for electric washing machines, ironers and vacuum cleaners. Machines are made in only a few standard heights and this keeps down number of patterns required.

Scientific Management

Scientific Management—V, Henry Atkinson. Eng. & Indus. Management, vol. 2, no. 13, Sept. 25, 1919, pp. 402-406, 4 figs. Charts suggesting organization for general engineering works.

Positive Contributions of Scientific Management. The Elimination of some Losses characteristic of present-day Manufacture, Henry H. Farquhar. Bul. Taylor Soc., vol. 4, no. 5, Oct. 1919, pp. 15-28. Mechanical aspects of scientific management are seen to be increased production, decreased cost, stimulus of knowledge. Human factors enumerated are industrial peace, high wages, proper working hours, promotion of health and well-being, free scope for individual initiative, opportunity for advancement and reduction of labor turnover.

Taylor's Principles in modern British Management, Robert Stelling. Eng. & Indus. Management, vol. 2, no. 15, Oct. 9, 1919, pp. 451-456. Writer explains principles of F. W. Taylor system. He observes that their adoption means shouldering of responsibility by management and that disinclination to do this must be overcome by education before a start can be made.

Signals

See Code Calling.

Working Conditions

The Influence of Hours of Work and of Ventilation on Output in Tinplate Manufacture, H. M. Vernon. Eng. & Indus. Management, vol. 2, nos. 14 and 15, Oct. 2 and 9, 1919, pp. 419-423 and 466-472, 7 figs. Records obtained at various plants in regard to effect in output of reducing working day from eight to six hours. Seasonal variation of output and its relation to surrounding temperature and ventilation. Report of Indus. Fatigue Research Board.

INSPECTION

Automobile Work

Defective Work. Automobile Engr., vol. 9, no. 130, Sept. 1919, pp. 286-288, 1 fig. Causes of and some suggestions for reducing rejections.

Leather Belting

Inspection of Leather Belting, Harry A. Hey. Indus. Management, vol. 58, no. 4, Oct. 1919, pp. 273-281, 20 figs. Methods for predetermination of performance and durability, noting special apparatus required for effecting tests.

LABOR

Engineers

Classification and Salaries of Engineers. Can. Engr., vol. 37, no. 17, Oct. 23, 1919, pp. 397-402. Schedule adopted by Toronto engineers includes titles, qualifications, and minimum salaries for technically trained men ranging from $1,200 to $12,000 per annum.

Housing

Building on a "Unit" System. Iron & Coal Trades Rev., vol. 99, no. 2691, Sept. 26, 1919, pp. 415-416, 2 figs. Arrangement for artisan's dwellings suggested by London company.

Colliery of Granby Consolidated Mining, Smelting and Power Co., Ltd., E. A. Haggen. Min. & Eng. Rec., vol. 24, no. 15, Aug. 15, 1919, pp. 209-219, 21 figs. Plans and details of industrial homes provided for workers are included.

The Report of the U. S. Housing Corporation. Am. Architect, vol. 116, no. 2283, Sept. 24, 1919, pp. 399-408 and 412-414, 15 figs., partly on supp. plates. Illustrated with examples of community and group building.

Solving the Industrial Housing Problem. Am. Drop Forger, vol. 5, no. 10, Oct. 1919, pp. 491-493, 4 figs. How Westinghouse Airbrake Co. formed new company to handle situation at Welmerding, Pa.

A Plan for Industrial Peace, Stephen C. Mason. Am. Industries, vol. 20, no. 3, Oct. 1919, pp. 7-8. Suggests entering into agreement containing, among other features, strongly worded provision pledging employers to give employees honest and generous day's pay, workers in turn pledging themselves to give honest and generous day's work.

Relations between Employer and Employee, Wm. M. Leiserson. Monthly Labor Rev., vol. 9, no. 4, Oct. 1919, pp. 207-216. Suggestions in regard to planning labor relations policy and creating labor administration organization.

Industrial Overstrain and Unrest, Charles S. Myers. Eng. & Indus. Management vol. 2, no. 16, Oct. 16, 1919, pp. 483-485. Determination of hours of labor and periods of rest in factories as well as distribution of periods of labor and rest during day, seen as questions which can best be settled by establishing National Institute of Psychology and Physiology, applied to Industry and Commerce, such as advocated in Eng. & Indus. Management of Sept. 25.

Labor Turnover

Labor Turnover in Chicago, Emil Frankel. Monthly Labor Rev., vol. 9, no. 3, Sept. 1919, pp. 44-59. Summary of results of inquiry made by Bur. of Labor Statistics into nature and extent of labor turnover in Chicago during war period.

Running away from Work and Jobs, Dale Wolf. Indus. Management, vol. 58, no. 4, Oct. 1919, pp. 269-271. Based on experience of writer who visited and investigated conditions in 32 plants representing various industries and a few mercantile establishments.

Language

The one Language industrial Plant, Winthrop Talbot. Indus. Management, vol. 58, no. 4, Oct. 1919, pp. 313-320. It is observed that over 500 industrial plants have found it good business to establish language classes for foreigners in their employ. Difficulties which are encountered in this form of teaching and manner in which they can be overcome are exposed.

Profit Sharing

The Industrial Problem, Charles Piez. Pac. Mar. Rev., vol. 16, no. 10, Oct. 1919, pp. 96-98. Profit sharing and partnership discussed as remedies for labor unrest.

A Means of Harmonising Capital and Labour, Frank Graham. Eng. & Indus. Management, vol. 2, no. 16, Oct. 16, 1919, pp. 498-500. Advocates copartnership or profit sharing in industrial enterprises.

Vocational Training

Management and Training of Employes, W. W. Gidley. Coal Industry, vol. 2, no. 10, Oct. 1919, pp. 471-473. Results of vocational training of worker in industries said to lie in convincing him that real efficiency reflects and conserves human element and increases earning power.

Wages

Cost of Living in Relation to Wage Adjustments, LeRoy D. Williams and Alfred B. Holt. Bul. Taylor Soc., vol. 4, no. 5, Oct. 1919, pp. 29-46, 4 figs. Research made at works of Holt Mfg. Co., Peoria, Ill.

A Defense of the Piece Rate Method of Wage Payment, Leon Bing. Indus. Management, vol. 58, no. 4, Oct. 1919, pp. 325-327. It is claimed that there are no practical administrative or psychological objections to any piece-rate system involved that cannot be removed by right-minded management.

Women

Women in Industry. Monthly Labor Rev., vol. 9, no. 4, Oct. 1919, pp. 217-221. Output of women workers in relation to hours of work in shell making.

Works Councils

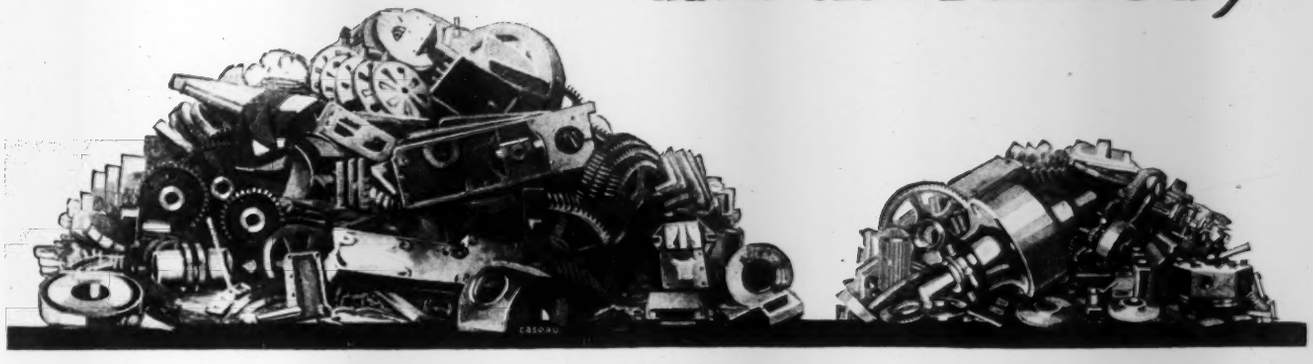
Austrian Law Establishing Works Councils. Monthly Labor Rev., vol. 9, no. 3, Sept. 1919, pp. 133-134. Election of workers' councils is made obligatory in establishments and factories where at least 20 workers are employed continuously for wages.

German Workers' Councils—Their Organizations and Functions, Alfred Maylander. Monthly Labor Rev., vol. 9, no. 3, Sept. 1919, pp. 120-133. Status planned for workers' councils in new economic structure of Germany. Article is based on announcement of government as to its legislative program with respect to workers' councils, comments in German press on this program, and resolutions adopted by second congress by workers' councils.

Works Council Serves as Court. Iron Trade Rev., vol. 65, no. 16, Oct. 16, 1919, pp. 1041-1043. Method of industrial administration followed by International Harvester Co. Right of appeal and arbitration are among important features of plan.

Tenth German Trade-Union Congress, Nuremberg, June 30 to July 5, 1919. Monthly Labor Rev., vol. 9, no. 4, Oct. 1919, pp. 284-290. Public boycott, work councils and joint industrial leagues discussed among other topics.

Scrap Piles
and the Remedy



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"While visiting a manufacturer in this district who had recently completed a contract for several million rounds of ammunition, the conversation centered on the percentage of his product that had been scrapped. He claimed that his scrap in the last two years, while working under the Limit System, was 80 per cent. less than the scrap accumulated in the two years prior to his war work and prior to the establishment of the Limit System of Inspection throughout his plant.

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Thus writes a supervisor of tool inspection whose observation has been broad and who believes that the ammunition instance was but a typical one.

Johansson Gages fix the plus and minus limits with exactness. They eliminate the personal element sure to be found when tools and output are *measured* rather than *gaged*. They enable workmen to use the full tolerance and to avoid unnecessary finishing. They save for both employer and employee.

Let us send you a book of general information about gaging systems and the Johansson Gages

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ACCURACY

Taylor-Wharton Plan. Eng. & Indus. Management, vol. 2, no. 14, Oct. 2, 1919, p. 439. Details of Work Council by which employees share in management.

LEGAL

Resale Prices

The Fixing of Resale Prices—III, Chesla C. Sherlock. Am. Mach., vol. 51, no. 13, Sept. 25, 1919, pp. 604-605. Decisions of bar studied in order to determine extent to which law sanctions restraint of trade.

Trademarks

The Use of Trade-Marks—I, Chesla C. Sherlock. Am. Mach., vol. 51, no. 14, Oct. 2, 1919, pp. 651-655. Difference between patent and trade-mark emphasized, and attitude of courts in regard to protection provided by trade-marks explained.

RECONSTRUCTION

European Industrial Needs

Industrial Needs of Europe Outlined. Iron Trade Rev., vol. 65, no. 18, Oct. 30, 1919, pp. 1197-1199. Opinions expressed at International Conference held at Atlantic City under auspices of Chamber of Commerce of U. S.

Machine-Tool Industry

From Engines of War to Instruments of Peace, W. H. Lloyd. Iron Trade Rev., vol. 65, no. 15, Oct. 9, 1919, pp. 974-981, 18 figs. Conditions in machine tool industry.

SAFETY ENGINEERING

Accident Classification

"Safety First"—Criticism of Accidents. Ry. Gaz., vol. 31, no. 13, Sept. 26, 1919, pp. 391-393, 3 figs. Great Western Railway's (England) system of classifying and recording causes of accidents.

Accident Reduction by Bonus

The Foreman's Bonus for Accident Reduction, Lucian W. Chaney. Monthly Labor Rev., vol. 9, no. 3, Sept. 1919, pp. 272-281. From statistics it is concluded that foreman's bonus for accident reduction tends very greatly to reduce minor injury but it does not necessarily operate to satisfactory reduction of more severe accidents. It is suggested that the bonus be reinforced by vigorous application of other measures.

Accidents

Industrial Accidents, Lucian W. Chaney. Monthly Labor Rev., vol. 9, no. 4, Oct. 1919, pp. 222-232, 1 fig. War-time trend of employment and accidents in a group of steel mills.

Cement Manufacture

Hazards of Cement Manufacture, R. Frame. Cement, Mill & Quarry, vol. 15, no. 7, Oct. 5, 1919, pp. 15-17. Based on experience of Alpha Co. at eight stock houses and six packing rooms during period from Jan. 1, 1918 to July 31, 1919.

Electrical Hazards

Industrial Safety—III, F. H. Reid. Power Plant Eng., vol. 23, no. 19, Oct. 1, 1919, pp. 873-874. Electrical hazards. Discussing power circuits, trolley wires, crowded shop conditions, etc. From lecture delivered before Schools for Safety Engrs., of Nat. Safety Council.

Erection, Steel

Safety Measures for Preventing Accidents in Steel Erection, E. A. Gibbs. Eng. & Contracting, vol. 52, no. 17, Oct. 22, 1919, pp. 460-461. Necessity for employing suitable equipment and selecting proper men for particular tasks is emphasized. Paper read before Eighth Annual Safety Congress.

Explosives

Safety Factors in Use of Explosives in Rock Quarrying, Walter O. Snelling. Cement, Mill & Quarry, vol. 15, no. 7, Oct. 5, 1919, pp. 27-31. Precautions to observe while firing, loading, tamping cartridge and preparing charge. It is particularly advised to avoid making electrical connections in too great haste while connecting up blast.

Safety Measures in Blasting Operations. Contract Rec., vol. 33, no. 42, Oct. 15, 1919, pp. 967-968. How to handle explosive to eliminate danger. Third Article.

See also MINING ENGINEERING, Explosives.

Fire Protection

Fire Protection for Military Establishments in the Home Commands, "Red Books" of the British Fire Prevention Committee, no. 206, London, 1917, 48 pp. Dangers of fire, fire-protective arrangements and fire service organization at military establishments.

The Legislation and Administration of the Fire Brigade Service of the United Kingdom together with a Scheme for its Reorganization, H. S. Bell. "Red Books" of the British Fire Prevention Committee, no. 233, 1919, 60 pp. Scheme proposed aims at remedying inefficiency of local authority brigades and absence of power to compel such authority to provide brigade in cases of necessity.

Hoisting Operations

Safety Measures in Hoisting Operations. Contract Rec., vol. 33, no. 43, Oct. 22, 1919, pp. 984-986, 1 fig. Precautions to observe about location of equipment, brakes, signals, selection and care of cables, and operators.

Mine Safety

Electrical Apparatus and Mine Safety, Graham Bright. Coal Indus., vol. 2, no. 9, Sept. 1919, pp. 370-372. Outlines safety precautions in installation of electrical apparatus at mines, with special reference to equipment for gaseous mines, power plants, fans, hoists, pumps and general conditions.

Safety Committees

Safety Committees in Workshops. Eng. & Indus. Management, vol. 2, no. 16, Oct. 16, 1919, pp. 493-494. Suggestions offered in pamphlet published by British Government in regard to duties of committees.

Methods of selecting Committees and maintaining Interest in Safety. Railroad Herald, vol. 23, no. 11, Oct. 1919, pp. 21-23. Suggests use of statistics either in statement form or by graphic chart showing common causes of accidents and class of employees suffering therefrom.

Safety Measures

The Fundamental Principles of Safeguarding, Sidney J. Williams. Can. Machy., vol. 22, no. 17, Oct. 23, 1919, pp. 410-411 and 415. Devices guarding every moving part, wherever located, on which workman might be injured if he came in contact with it in any way, or from any cause whatsoever. Paper read before Eighth Annual Safety Congress.

Steel Plants

Promoting Safety in Steel Plant, H. P. Heyne. Iron Trade Rev., vol. 65, no. 17, Oct. 23, 1919, pp. 1110-1111. It is noted that main qualification of safety engineering must be to study human nature and to be capable of winning co-operation of all employees. Experiences of one company in reducing accidents are quoted. Paper read before National Safety Council.

See also Accidents.

Welding

Oxy-acetylene and the Safety First Movement, A. Cressy Morrison. Can. Machy., vol. 22, no. 15, Oct. 9, 1919, pp. 372-375. Address delivered before Western Pa. Division of National Safety Council.

West Virginia

Progress in Rescue and First Aid in W. Va., W. J. Heatherman. Coal Indus., vol. 2, no. 9, Sept. 1919, pp. 356-358, 2 figs. Claims that West Virginia is foremost state in first-aid, rescue and mining education: it has seven rescue stations.

SALVAGE

Foundry Practice

Educational Value of the Scrap Pile, Henry Traphagen. Iron Trade Rev., vol. 65, no. 14, Oct. 2, 1919, pp. 892-893. Said to lie principally in affording opportunity to study conditions in foundry practice. Paper presented before Am. Foundrymen's Assn.

Oil and Waste

Reclaiming Waste and Oil, J. Emile Coleman. Machy. (N. Y.), vol. 26, no. 2, Oct. 1919, pp. 132-133, 1 fig. Outfit consisting of steam turbine-driven centrifugal machine, in which oil is extracted by centrifugal force, waste is washed in boiling water and subsequently rinsed in fresh water and finally dried centrifugally.

New Process for Removing and Salvaging Oil in Copper Manufacture (Die neue Entölungs-und Oelruckgewinnungsanlage für die Rheinisch-Westfäl. Kupferwerke Akt. Ges. Olpe Westfalen), Münkner. Gesundheits-Ingenieur, vol. 42, no. 27, July 5, 1919, pp. 273-274, 2 figs. Description of installation.

Paper Manufacture

Centrifugal Device as Mill Save-All. Paper, vol. 25, no. 3, Sept. 24, 1919, pp. 21-23, 11 figs. Describing apparatus for recovering pulp fibers, etc., from liquids.

Rubber Factories

Reducing Waste in Rubber Factories, Robert C. Kelley. India Rubber World, vol. 61, no. 1, Oct. 1, 1919, pp. 7-9, 4 figs. Forms of scrap reports and methods for handling waste.

TRANSPORTATION

Automobile Factories

Automobile Factory Transportation Systems, Edward K. Hammond. Machy. (N. Y.), vol. 26, no. 2, Oct. 1919, pp. 123-128, 10 figs. Also Machy. (Lond.), vol. 15, no. 367, Oct. 9, 1919, pp. 33-38, 10 figs. Types of equipment used for transporting raw materials and parts of product through plant of Willys-Overland Co., Toledo, O.

Contractor's Trucks

Maintenance Methods for Contractor's Trucks. Commercial Vehicle, vol. 21, no. 5, Oct. 1, 1919, pp. 170-172, 5 figs. Details of solution of special problems created by severe service and necessity for speed in contract.

Electric Trucks

Industrial Electric Trucks and Tractors in Machine Shops, Bernard J. Dillon. Elec. Rev., vol. 75, no. 17, Oct. 25, 1919, pp. 683-685, 4 figs. Illustrating various applications to hauling materials around shop and lifting them on to machines.

Electrical Engineering

BATTERIES

Dry Cells

Tests to Determine Deterioration of Small Dry Cells with Age, A. J. Helfrecht. Elec. Rev. (Chicago), vol. 75, no. 15, Oct. 11, 1919, pp. 603-604, 4 figs. Curves showing variations in performance as cells decreased in size.

Storage Batteries

Large Batteries for Power Purposes, E. C. McKinnon. Jl. Instn. Elec. Engrs., vol. 57, no. 284, July 1919, pp. 493-509 and (discussion) pp. 510-531, 7 figs. Discussing the evolution of large batteries, battery-room design, standardization, high-tension batteries, central station batteries, stand-by batteries, working results, control of large batteries and future aspect relative to large batteries.

ELECTROPHYSICS

Cables

Tables of Maxima Values of Current Intensity in Electrical Conductors of Cables (Tabelle dei valori massimi delle intensità di corrente nei conduttori e cavi elettrici), E. Soleri. Elettrotecnica, vol. 6, no. 27, Sept. 25, 1919, pp. 574-579, 4 figs. Comparative study of permissible values standardized by technical associations in Italy, France, England, Switzerland and Austria.

Current Distribution in Armature Conductors

Current Distribution in Armature Conductors, Waldo V. Lyon. Mass. Inst. Technology, Elec. Eng. Dept., Research Division, no. 19, July 1919, 13 pp., 3 figs. Equations are derived showing how a. c. resistance depends upon depth of slot. Scheme is then proposed for investigating circulations of deep-slot induction motors with high torque.

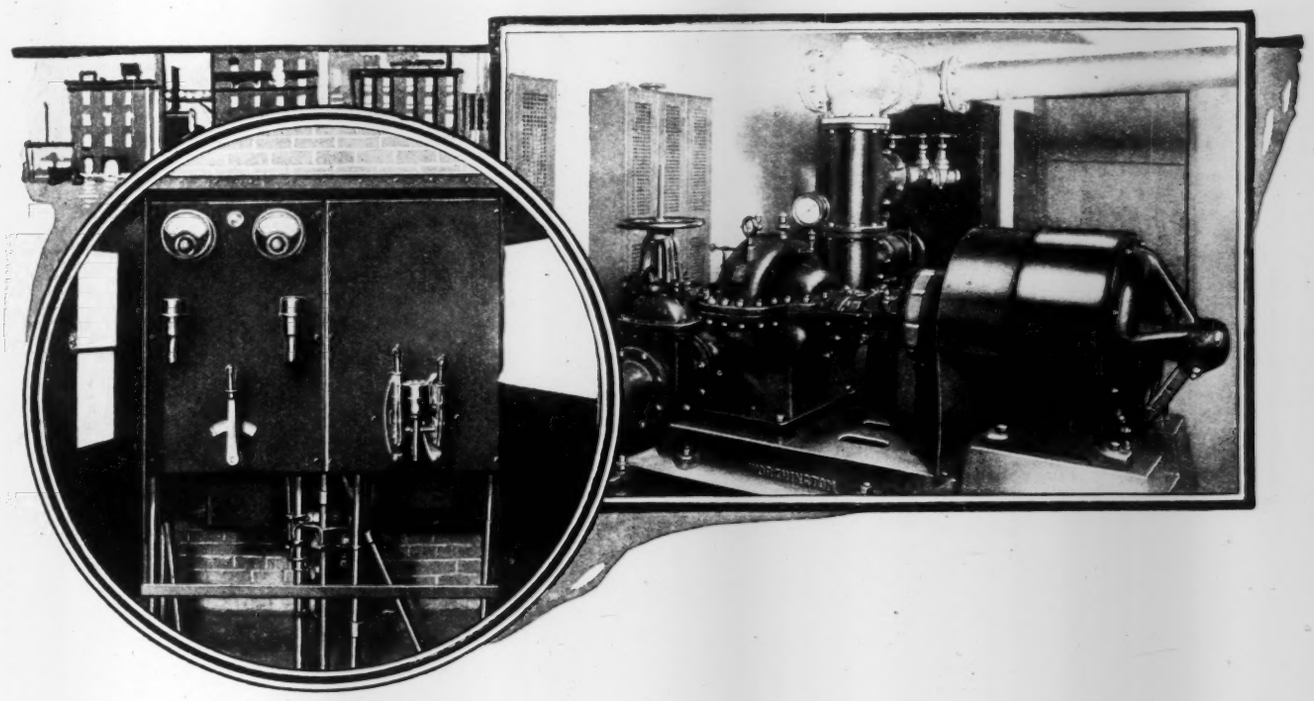
De-Ionization

Determination of Rate of De-Ionisation of Electric Arc Vapor, Henry G. Cordis. Proc. Inst. Radio Engrs., vol. 7, no. 5, Oct. 1919, pp. 527-539, 5 figs. After discussing de-ionization and consequent loss of conductivity of mercury vapor carrying momentary arc, writer considers arrangement of circuits for determining rate of de-ionization, and effect of this rate of voltage required for subsequent re-ignition. Theory of circuits is given and illustrated by numerical examples.

High-Tension, High-Frequency Apparatus

High Potential, High Frequency Apparatus and Experiments. Jl. Eng. Inst. Can., vol. 11, no. 10, Oct. 1919, pp. 663-668, 10 figs. Experiments were concerned with alternating current of very high frequencies, which consisted of separate groups of alternating currents, each group begnning with same amplitude but damping down more or less rapidly to zero and after short period of time beginning again. General arrangement of apparatus for high-potential high-frequencies experimental cabinet is illustrated.

Fire risk is practically eliminated by electric motor-driven pumps which start when a switch is closed



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ELECTRIC power from either our power plant or from the Philadelphia Gas and Electric Company, with its duplicate stations, generators, and power lines, is used to operate this G-E motor-driven fire pump in our Philadelphia factory if a sprinkler head is opened. This starting up is done quickly, not slowly, as is necessary with steam engine driven pumps.

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Many of these G-E motor-driven fire pump installations all over the country are reducing premiums for their owners. May we reduce yours?

General Electric Company

General Office Schenectady, N.Y.

43-258

Inductances

A Note on the Comparison of Inductances, or of an Inductance and a Capacity by an Electrometer Method. Alva W. Smith. Phys. Rev., vol. 14, no. 4, Oct. 1919, pp. 356-360, 3 figs. Equation connecting deflection of electrometer with inductance capacity and current in circuit is developed.

Polarization of Geissler Discharge

Polarisation in the Geissler Discharge (Ueber die Polarisation in der Geisslerentladung). Erich Rumpf. Annalen der Physik, vol. 59, no. 1, June 13, 1919, pp. 1-27, 7 figs. Method which makes it possible to demonstrate polarization, manifesting itself in various ways, similar to electrolytic polarization, in a Geissler tube.

Resistance of Pure Metals

Study on Resistance of pure Metals (Ueber die Abhängigkeit des Widerstandes reiner Metalle von der Temperatur). L. Holborn. Annalen der Physik, vol. 59, no. 2, June 20, 1919, pp. 145-169, 1 fig. Tables and curves showing resistance coefficient of iron, nickel, tungsten, molybdenum, rhodium, aluminum, platinum and others.

Vacuum Valve

The Three-Electrode Thermionic Valve as A. C. Generator. C. L. Fortescue. Elecn., vol. 83, nos. 2157 and 2160, Sept. 19, 1919, and Oct. 10, 1919, pp. 294-295 and 414-416, 9 figs. Also in Elec. Rev. (Lond.), vol. 85, no. 2185, Oct. 10, 1919, pp. 456-457, 9 figs. Work done during war in wireless telegraphy department of English Signal School at Portsmouth. Calculations for determining conditions for maintenance of oscillations. Paper read before British Assn. for Advancement of Sci.

A Method of Using Two Triode Valves in Parallel for Generating Oscillations. W. H. Eccles and F. W. Jordan. Elecn., vol. 83, no. 2157, Sept. 19, 1919, p. 299, 5 figs. In order to obtain more symmetrical oscillations, writers suggest arranging two tubes in such a way that flywheel circuit is acted upon by a triode and high-voltage battery symmetrically in every half period.

X-Rays

Soft X-Rays. H. M. Dadourian. Phys. Rev., vol. 14, no. 3, Sept. 1919, pp. 234-246, 8 figs. Produced by impact of electrons hot-lime cathode against platinum anode, using potentials of 20 to 1000 volt.

FURNACES

Duplex Process

Electric Furnace Improves Gray Iron, George K. Elliott. Foundry, vol. 47, no. 330, Sept. 1, 1919, pp. 585-586. Duplex process of melting in cupola and finishing in electric furnace is advocated for certain classes of gray-iron casting where quality is first requisite. Paper read at meeting of Am. Electrochem. Soc.

Heat-Treating Furnaces

Electric Furnaces for Heat Treatment of Steel. Elecn., vol. 83, no. 2158, Sept. 26, 1919, pp. 375-377. It is stated that while electric heating alone cannot compete with cost of gas or coke firing, advantages of control, accuracy, uniformity, absence of distortion and smallness of rejections are so enormous that there is no question that future is with electric furnace.

Steel Furnaces

Electrical Furnaces from a Steel Maker's Point of View, J. W. Naylor. Elecn., vol. 83, no. 2158, Sept. 26, 1919, pp. 363-367, 6 figs. It is observed that electric furnaces served their purpose during war by increasing output, which was of vital importance, but are now being superseded by Siemens, owing to competition, except for steels of superior quality, for which better price can be obtained.

Wild-Barfield Furnace

The Wild-Barfield Electric Furnace. Automobile Engr., vol. 9, no. 130, Sept. 1919, pp. 290-293, 8 figs. Decalescent point is employed for electro-magnetic temperature recording.

GENERATING STATIONS

Canadian Plant

Hydroelectric Plant and Paper Mill at Ocean Falls, B. C., W. A. Scott. Elec. Rev. (Chicago), vol. 75, no. 14, Oct. 4, 1919, pp. 551-554, 7 figs. Featuring Canadian properties of Pacific Mills, Ltd., and electric drive of large paper machines said to be unique.

China

Electrical Enterprise in China. Elec. Times, vol. 56, no. 1460, Oct. 9, 1919, pp. 278-280, 8 figs. Types of electrical stations and sub-stations used.

Denver

New Electric Generating Station at Denver, H. H. Kerr and T. O. Kennedy. Jl. Electricity, vol. 43, no. 7, Oct. 1, 1919, pp. 306-308, 4 figs. Concerning boiler-room equipment, ventilation arrangement and pumping units of 15,000-kw. station.

High D. C. Voltages

New Connection for Producing high D. C. Voltages (Eine neue Schaltung fur die Erzeugung hoher Gleichspannungen), M. Schenkel. Elektrotechnische Zeitschraft, vol. 40, no. 28, July 10, 1919, pp. 333-334, 2 figs. Especially designed for testing and scientific purposes. Principal advantage said to be that the required alternating voltage itself need not be high.

Large Stations

Large High-Tension Alternating-Current Electric Stations (Les grands postes électriques à courant alternatif haute tension), A. Hayet. Revue Générale de l'Electricité, vol. 6, no. 10, Sept. 6, 1919, pp. 299-309, 6 figs. Concerning selection of transformers, connections of network, distances between insulators and earth connections. (Continuation of serial.)

Merz-Price Protection Methods

Merz-Price Protection for Alternators and Transformers, C. W. Marshall. Elec. Rev., London, vol. 85, no. 2181, Sept. 12, 1919, pp. 345-346, 3 figs. System said to be of great value in maintaining continuity of supply.

Power Factor

The Improvement of Power Factor, E. W. Dorey. Electrical Review, vol. 85, no. 2186, Oct. 17, 1919, pp. 484-485, 2 figs. Tables showing effect of speed and load on power factors, based on actual data of motors. (To be continued.)

Rates

Central-Station Rates in Theory and Practice, H. E. Eisenmenger. Elec. Rev. (Chicago), vol. 75, nos. 14, 15, 16 and 17, Oct. 4, 11, 18 and 25, 1919, pp. 555-558, 599-602, 643-648 and 686-690, 19 figs. Oct. 4: Differentiating between classes of service; value of service according to size of customers and use; isolated plants and other competitions in light. Oct. 11: Study of systems of charge in vogue. Oct. 18: Study of stepmeter rate. Oct. 25: Methods for applying lower average kilowatt hour for larger consumers.

Simplon Tunnel

New Installations of Simplon Tunnel (Les nouvelles installations du tunnel du Simplon). Génie Civil, vol. 75, no. 15, Oct. 11, 1919, pp. 337-344, 20 figs. Details of hydro-electric plant at Massaboden, near Brig, Switzerland. (From Schweizerische Bauzeitung.)

GENERATORS AND MOTORS

Asynchronous Motors, Starting

Starting of Asynchronous Motors by Means of Tertiary Eddy Currents, R. Rüdenberg. Elecn., vol. 83, no. 2160, Oct. 10, 1919, pp. 422-423, 4 figs. Proposed arrangement where secondary circuit of motor is connected through transformer with tertiary circuit in which considerable resistance is inserted. When at rest, rotor winding receives full frequency of network, so that transformer produces very small effect on current. Translated from Elektrotechnische Zeitschrift.

Bearings, Railway Motor

Railway Motor Bearings, J. S. Dean. Elec. Jl., vol. 16, no. 10, Oct. 1919, pp. 443-446, 18 figs. Method of manufacturing outlined and operations illustrated.

Coolers

New Types of Coolers for Electric Machinery (Neuere Kühleinrichtungen für elektrische Maschinen). Elektrotechnischer Anzeiger, vol. 36, nos. 65, 66 and 73, June 29, July 1 and 17, 1919, pp. 297-298, 303-304, and 339-340, 17 figs. Describing methods and designs for cooling turbo generators, for preventing overheating of commutator and collector rings and fires in air filters, and for cooling three-phase motors. (Concluded.)

Gears, Helical

Decreased Operating Costs with Helical Gears, G. M. Eaton. Elec. Jl., vol. 16, no. 10, Oct. 1919, pp. 430-433, 2 figs. Because, it is said, these gears operate under conditions where weight reduction may be effected.

Induction Motor

The Synchronized Induction Motor, F. Keith D'Alton. Elec. News, vol. 28, no. 20, Oct. 15, 1919, pp. 39-41 and 44, 10 figs. Account of tests of standard one horsepower, four-pole squirrel-cage motor, made in order to study possibilities of having machine synchronizing itself by modifying rotor.

Parallel Operation

Parallel Running of D. C. Series Motors for Traction Purposes (Das Parallelarbeiten von Gleichstrom-Reihenschlussmaschinen im Bahnbetriebe), Hans Engel. Elektrische Kraftbetriebe und Bahnen, vol. 17, no. 18, June 25, 1919, pp. 137-143, 20 figs. Discussion of problems in trains with direct control, having large number of motors. Systematic investigation of their possible parallel connections.

Rolling-Mill Drives

Motors for Rolling-Mill Table Drives, W. S. Hall. Blast Furnace & Steel Plant, vol. 7, no. 10, Oct. 1919, pp. 505-507, 2 figs. Curves and data obtained from existing installations.

LIGHTING AND LAMP MANUFACTURE

Filament Temperature

Temperatures of Incandescent-lamp Filaments, Benj. E. Shackelford. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2265-2269, 6 figs. Relations between temperature, efficiency, lamp size, and life of incandescent lamps, insofar as they effect rating of product and its use by individual consumer.

Flash Lights

Pocket Electric Flash Light Fitted with Mechanical Generator (Lampe électrique de poche à générateur méchanique d'électricité). Industrie Electrique, vol. 28, no. 655, Oct. 10, 1919, pp. 367-369, 3 figs. Armature of magneto is operated by action of lever arranged to be pressed by hand.

Indirect Lighting

Indirect Lighting with Marble Plates (La lumière de marbre). Electricien, vol. 48, no. 1231, Aug. 1, 1914, pp. 65-67, 2 figs. Experiments on transparency of marble plates three to twenty millimeters thick and their use in electric lamps.

Motor-Car Lighting

Powell and Hanmer Electric Lighting Installations. Autocar, vol. 43, no. 1247, Sept. 13, 1919, pp. 423-426, 7 figs. System incorporates mechanical control of dynamo speed, which is said to simplify electrical gear and permit standard practice to be followed.

National Electric Light Association

National Electric Light Association Lighting Exhibit, G. F. Morrison. Gen. Elec. Rev., vol. 22, no. 10, Oct. 1919, pp. 776-782, 13 figs. Exhibit featured recent development in industrial, home, and educational lighting.

A Review of the N. E. L. A. Lamp Committee Report, G. F. Morrison. Gen. Elec. Rev., vol. 22, no. 10, Oct. 1919, pp. 767-775, 8 figs. Statistics and record of progress of incandescent lighting equipment.

Street Lighting

Street-Lighting Reconstruction Problems, L. Gaster. Illuminating Engr., vol. 12, no. 8, Aug. 1919, pp. 225-232 and (discussion) pp. 233-236, 5 figs. Remarks based on official data in city of London on street accidents which took place at the time street lighting was diminished during the war.

Street Lighting and Traffic Accidents, Ward Harrison. Elec. Rev. (Chicago), vol. 75, no. 15, Oct. 11, 1919, pp. 605-606, 2 figs. Analysis of year's traffic accidents in Cleveland as to time of day and season shows large percentage due to lack of light. Hence the value of good street lighting is emphasiezd.

Weave-Room Illumination

A Few Examples of Weave-Room Illumination in Textile Mills, Kenneth A. McIntyre. Elec. News, vol. 28, no. 19, Oct. 1, 1919, pp. 43-44, 4 figs. With suggestions in regard to problems of industrial illumination.

Announcement

We are prepared to demonstrate that the Fay Automatic Lathe offers the best known means for performing certain operations on the following automobile, truck, tractor and internal combustion engine parts:

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C1

MEASUREMENTS AND TESTS

Alternator Tests

Tests of Alternators while Running at Part Load. (Essai à puissance réduite des alternateurs), M. Togna. Revue Générale de l'Electricité, vol. 5, no. 25, June 21, 1919, pp. 875-879, 8 figs. Generalization of uses of flux meter. Sequel to discussion presented by writer in R. G. E., May 31, 1919.

Anemometer

A Hot-wire Anemometer with Thermocouple, T. S. Taylor. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1605-1608, 2 figs. A hot-wire anemometer consisting of small platinum heating wire and having copper-constantan thermocouple attached at its mid-point is said to have been found useful in measuring distribution of gas flow across small channels.

Conductivity Measurement

Application of the Thermionic Amplifier to Conductivity Measurements, R. E. Hall and L. H. Adams. Jl. Am. Chem. Soc., vol. 41, no. 10, Oct. 1919, pp. 1515-1525, 4 figs. It is claimed that amplifier used in conjunction with telephone in measurement of resistance on solutions makes much simpler determination of balance position of bridge; electron tube suggested as source of alternating current for conductance measurements because of its cheapness and wide range of frequencies which may be obtained with it.

A Method of Measuring without Electrodes the Conductivity at Various Points along a Glow Discharge and in Flames, Balth. van der Pol. Lond., Edinburgh, and Dublin Phil. Mag., vol. 38, no. 225, Sept. 1919, pp. 352-364, 8 figs. Experiments with body placed near free ends of Lecher wires where potential loop occurs. Mathematical theory of phenomena involved is also presented.

Electrometer-Condenser Operation

Operation of the Variable Condenser in Combination with a Quadrant Electrometer (Condensateur variable modifié pour l'emploi avec l'électromètre à quadrants), Harry Clark. Radium, vol. 11, no. 8, June 1919, pp. 235-236, 3 figs. For the purpose of maintaining equal capacity of apparatus throughout experiment.

Electron Tubes

Measurements on Electron Tubes (Ueber Messungen an Elektronenröhren), H. G. Möller, Archiv für Elektrotechnik, vol. 8, no. 1, July 15, 1919, pp. 46-58 21 figs. Describing experimental arrangement of amplifiers sender and audion tubes, as well as measurements made; points which have to be considered in order to avoid errors.

Fault Localization

Some Notes on Fault Localisation, G. W. Stubbings. Elec. Rev. (London), vol. 85, no. 2185, Oct. 10, 1919, pp. 452-454. Bridge tests for fault localization on underground cables are believed to have advantage that they are not susceptible to inaccuracies through variation of resistance of fault.

Galvanometers

The Six-String Einthoven Galvanometer, Engineering, vol. 108, no. 2799, Aug. 22, 1919, p. 255, 4 figs. Six wires replace coil of moving coil galvanometer. They are stretched in narrow air gap between poles of powerful electromagnet. When a current passes up or down them they are deflected in direction of right angles to magnetic field. Movement is observed with aid of microscope which passes through pole pieces.

Potentiometer

A Rectangular-Component Two-Dimensional Alternating-Current Potentiometer, A. E. Kennelly and Edy Velander. Mass. Inst. Technology, Elec. Eng. Dept., Research Division, no. 18, July 1919. 26 pp., 20 figs. Form developed by Alfred E. Hanson, said to be particularly adapted to telephonic frequency measurements.

New Blondel-Touly Potentiometer Amplifying Devices (Sur de nouveaux dispositifs amplificateurs potentiometriques de Blondel et Touly), A. Blondel. Revue Générale de l'Electricité, vol. 6, no. 14, Oct. 4, 1919, pp. 427-441, 10 figs. Combining two audions connected in cascade and three batteries. Armstrong principle of regeneration is utilized.

Wave, Alternating Measurements

The Measurement of Alternating Waves with the Braum Tube, E. Läbke. Elecn., vol. 83, no. 2156, Sept. 12, 1919, pp. 270-272, 9 figs. Describes inertialess contact maker consisting of ionization of a gas by means of cathode rays, for purpose of delineating oscillatory curves by Joubert method. Arrangement of special double Braun tube, using glowing cathode and steady voltage of 220, said to lend itself to measurement of high-frequency fields on account of very small current requirements. From Archiv für Elektrotechnik.

MATERIALS OF CONSTRUCTION

Commutators

The Making of Commutators, W. F. Sutherland, Power House, vol. 12, no. 14, Sept. 5, 1919, pp. 387-389, 8 figs. Materials of construction and mechanical details. First article.

Insulators

Deterioration of High-Tension Insulators (Zerstörungserscheinungen an Hochspannungsisolatoren), E. O. Meyer. Elektrotechnische Zeitschrift, vol. 40, nos. 16, 18 and 24, Apr. 17, May 1 and June 12, 1919, pp. 173-176, 198-200 and 278-282, 31 figs. Effect of thermic influences on insulating material.

POWER APPLICATION

Blast-Furnace Plants

Electrical Practice in the Equipment of Blast-Furnace Plant, J. Percy Hodges. Elecn., vol. 83, no. 2158, Sept. 26, 1919, pp. 333-338, 9 figs. Including uses of capstans, transfer and telpher cars, hoists and overhead travelling cranes equipped with electro-magnets for clearing pig beds.

Docks

Electrical Control of the Sluices and Lock Gates of the Floating Dock at Boulogne (La commande électrique des vannes et des portes de l'écluse à cas du bassin à flot du port de Boulogne), A. Foillard. Génie Civil, vol. 75, no. 15, Oct. 11, 1919, pp. 348-361, 9 figs. Schematic arrangement and details of winches.

Domestic Uses

Notes on the Application of Electricity to Domestic Services, J. H. Dobson, H. A. Tinson and R. H. Gould. Trans. South African Inst. Elec. Engrs., vol. 10, no. 8, Aug. 1919, pp. 114-120 and (discussion) pp. 120-123. Tests on economical value of application of electricity to domestic uses, carried out at laboratory of Johannesburg Elec. Supply Dept.

Drives, Electric

Outline Status of Electric Drive, Wilfred Sykes. Iron Trade Rev., vol. 65, no. 18, Oct. 30, 1919, pp. 1184-1185, 1 fig. It is noted that development of electrically-driven reversing rolling mills has been rapid and that reversing motor has been used economically on all types of mills. Paper read before Am. Iron & Steel Inst.

Magnets, Lifting

Developments in Lifting Magnet Practice, F. N. Pickett. Elecn., vol. 83, no. 2158, Sept. 26, 1919, pp. 349-352, 7 figs. Illustrating uses and various applications including handling of pig-iron steel rails and plates.

Mill Auxiliaries

The Electric Control of Steel-Mill Auxiliaries, C. Howard. Elecn., vol. 83, no. 2158, Sept. 26, 1919, pp. 339-348, 15 figs. Automatic control as against hand control is considered particularly advantageous in steel works; with regard to types of control writer gives details of four classes.

Mills, Reversing

The Future of the Electrical Equipment of Small Reversing Mills, L. Rothera. Elecn., vol. 83, no. 2158, Sept. 26, 1919, pp. 368-369, 3 figs. It appears to writer that at present capabilities and advantages of small reversing mill plant have not been fully grasped by manufacturers, but he anticipates that, with increasing necessity for large output and reduction in operating cost, future will see wide extension of electrical reversing drive for small mills.

Rolling Mills

The Electrical Driving of Rolling Mills, A. P. Pyne. Elecn., vol. 83, no. 2158, Sept. 26, 1919, pp. 324-332, 18 figs. Most suitable type of motor to fulfill given requirements is considered; also conditions under which rope or gear drives should be adopted.

See also Mills, Reversing.

Tools, Portable

Portable Electric Tools, E. Preston. Eng. & Indus. Management, vol. 2, no. 16, Oct. 16, 1919, pp. 486-487, 2 figs. Development in Great Britain during the war, notably in electric drills and hammers for riveting.

STANDARDS

Voltage Standardization

Voltage Standardization in Switzerland—V (Zur Frage der Vereinheitlichung der Betriebsspannungen in der Schweiz). Bul. Assn. Suisse des Electriciens, vol. 10, no. 8, Aug. 1919, pp. 215-232. Advantages and difficulties of introducing higher voltage as standard; its relation to cost of manufacture of incandescent lamps and motors, cable lines and installations for domestic purposes.

TELEGRAPHY AND TELEPHONY

Amplifiers

High-Vacuum Amplifiers—I and II (Ueber Hochvakuumverstärker), W. Schottky. Archiv der Elektrotechnik, vol. 8, no. 1, July 15, 1919, pp. 1-31, 10 figs. Constructional details.

Application of Amplifiers to the Mechanical Inscription of Wireless Signals (Application des amplificateurs à l'inscription mécanique des signaux de télégraphie sans fil), Henri Abraham and Eugène Bloch. Revue Générale de l'Electricité, vol. 6, no. 11, Sept. 13, 1919, pp. 323-324. Describing method of inscribing wireless signals by aid of amplifiers without employing mechanical relay.

See also Vacuum Tubes.

Antennæ

Radiation of the Antenna (Die Strahlung von Antennen-systemen). Max Abraham. Jahrbuch der drahtlosen Telegraphie und Telephonie, vol. 14, no. 2, July 1919, pp. 146-152. Points to theory of electromagnetic field as basis of wireless telegraphy since it determines radiation and thereby efficiency of system.

Airplane Antenna Constants, J. M. Cork. Dept. Commerce, Sci. Papers of Bur. of Standards, vol. 15, no. 341, Sept. 1, 1919, pp. 199-213, 12 figs. Measurements of effective capacity, effective resistance, true capacity, true inductance, and wave length, and study of directional effect of various types of airplane antennæ.

Cables, Telephone

Engineering Problems Involved in the Use of Telephone Cables. Jl. Eng. Inst. Can., vol. 11, no. 10, Oct. 1919, pp. 669-671. Concerning mechanical details of construction required by reason of electric phenomena taking place between wire in cable.

Cathode-Ray Tube

Applications of the Cathode-Ray Tube in Radio Work, L. E. Whittemore and L. M. Hull. Phys. Rev., vol. 14, no. 3, Sept. 1919, pp. 266-267, 1 fig. Tube using platinum filament coated with mixture of calcium and barium oxides said to have proven successful in work undertaken by Bureau of Standards.

Direction Finder

An Electrostatic Direction Finder, E. Bellini. Elecn., vol. 83, no. 2156, Sept. 12, 1919, pp. 273-275, 13 figs. Describing new radiogoniometer utilizing electrostatic coupling between aerials and apparatus for detecting or generating oscillations.

Eilvese Radio Station

Radio Station at Eilvese (Hanover), (Radio-Grosstation Eilvese, Hanover), Aage S. M. Sörensen. Elektrotechnische Zeitschrift, vol. 40, no. 21, May 22, 1919, pp. 233-234, 4 figs. Detailed description of high frequency apparatus, antenna, operation and efficiency of Eilvese station.

Interference

Influence of Railroad Electrification on Telephone Lines, Fred W. Scholz. Telephone Engr., vol. 22, no. 4, Oct. 1919, pp. 37-40, 3 figs. Technical study of electric field in interior of telephone cable as affected by an electric traction line. Translated from Annales des Telegraphes et Telephones.

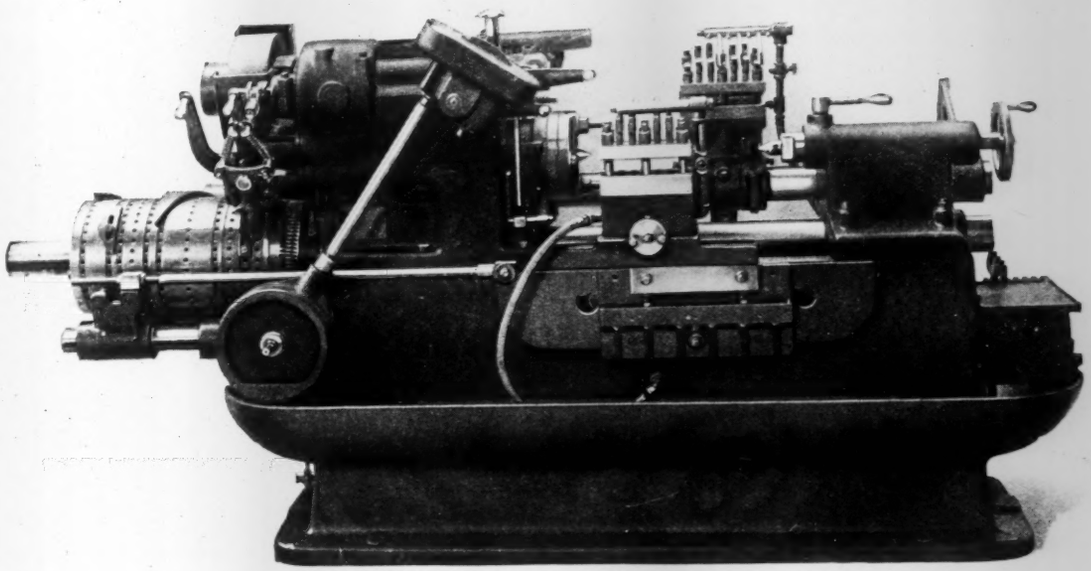
Multiple Telephony and Telegraphy

Multiple Telephony and Telegraphy by Means of High-Speed Alternating Currents (Mehrfach-Telephonie und Telegraphie mit schnellen Wechselströmen), Karl Willy Wagner. Telegraphen-und Fernsprech-Technik, vol. 8, no. 3, June 1919, pp. 29-35, 11 figs. Historical account; damping of high-speed a. c. in overhead lines and cables; experiments with multiple telephony; future of new method.

Receiver Circuits

On the Theory of Radiotelegraphic and Radiotelephonic Receiver Circuits, J. F. J. Bethenod. Proc. Inst. Radio Engrs., vol. 7, no. 5, Oct. 1919, pp. 517-525, 3 figs. Proceeding

The Fay Automatic Lathe



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from theory of approximate rectifying detector, most advantageous proportioning of constants of secondary circuits of receiver is obtained. Constants of most desirable telephone winding and value of most suitable telephone shunting condenser are then derived.

Receivers, Air

The Uni-Control Receiver, Roy E. Thompson. Proc. Inst. Radio Engrs., vol. 7, no. 5, Oct. 1919, pp. 499-514 and (discussion) pp. 515-516. Design and construction of air receiver operating efficiently and selectively over a long range of wave lengths of antenna of ordinary dimensions, and controlled by single handle, are described, and possibilities of such a receiver for solution of interference problems are discussed. Addition of motor for driving wave-changing adjustment continuously is shown.

Telegraphy, Wireless

Wireless in the A. E. F., L. R. Krumm and Willis H. Taylor. Wireless Age, vol. 7, no. 1, Oct. 1919, pp. 9-21, 26 figs. Account of organization of radio division of signal corps with remarks on obstacles which Americans had to overcome.

Telephone, Hot-Wire

The Hot-Wire Telephone. Telephone Eng., vol. 22, no. 4, Oct. 1919, pp. 35-36, 1 fig. Form used for range finding in war.

Telephones, Los Angeles

Los Angeles Manual-Automatic Unification. D. E. Wiseman. Telephone Engr., vol. 22, no. 4, Oct. 1919, pp. 19-24, 10 figs. Plans for physical consolidation of Bell manual and automatic electric telephone systems which previously to June 1, 1918, operated as separate systems. Under new system each subscriber has access to every other subscriber and to all long-distance lines center in district. Paper presented at Section Meeting of A. I. E. E. at San Francisco.

Telephony, Radio

Radio Telephony, E. H. Colpitts. Jl. Soc. Automotive Engrs., vol. 5, no. 3, Sept. 1919, pp. 212-218, 11 figs. Historical review of experimental work and description of apparatus available at present.

Thermionic Valve

See Electrophysics.

Trigger Relay

A Trigger Relay Utilising Three-Electrode Thermionic Vacuum Tubes, W. H. Eccles and F. W. Jordan. Elecn., vol. 83, no. 2157, Sept. 19, 1919, p. 298, 2 figs. Describing what may be called a one-stroke relay which, when operated by a small triggering electrical impulse, undergoes great changes in regard to its electrical equilibrium and then remains in the new condition until re-set. Paper read before British Association.

Tube Transmitters

Tube Transmitter (Ueber Röhrensender), A. Meissner. Jahrbuch der drahtlosen Telegraphie und Telephonie, vol. 14, no. 1, May 1919, pp. 5-26, 22 figs. Experiments said to have shown that efficiency increases as grid voltage decreases; however, at the same time the power too is somewhat reduced.

Vacuum Tubes

Vacuum Tubes as Amplifiers and Vibration Producers (Vakuumröhren als Verstärker und Schwingungserzeuger), K. Mühlbrett. Archiv der Elektrotechnik, vol. 8, no. 1, July 15, 1919, pp. 32-42, 8 figs. Experimental investigation of tubes.

High-Vacuum Tube with One Electrode (Die Hochvakuum-Eingitterröhre), H. Rukop. Jahrbuch der drahtlosen Telegraphie und Telephonie, vol. 14, no. 2, July 1919, pp. 110-146, 15 figs. Constants of one-electrode tube; the tube as amplifier; the tube as vibration producer; inner resistance of tube, relations between efficiency and inner and outer resistance.

See also Amplifiers.

Vacuum-Tube Circuit

Some Modern Vacuum-Tube Circuits and Their Operation, J. Scott-Taggart. Wireless Age, vol. 7, no. 1, Oct. 1919, pp. 25-27, 4 figs. "Stand-by" and "tuned" continuous-wave receiver, and continuous-wave transmitter.

TRANSFORMERS, CONVERTERS, FREQUENCY CHANGERS

Fires in Transformers

Fires in Oil Transformers (Oel-Transformatorenbrände), Willibald Fuhrmann. Elektrotechnischer Anzeiger, vol. 36, no. 71, July 13, 1919, pp. 329-330. To prevent such fires writer recommends contact thermometer, to be connected with maximum automat in the case of unguarded stations; also fuses of metals having low melting point such as tin, lead or bismuth.

Heating of Transformers

The Heating Problem in Dry Transformers (Das Erwarmungsproblem des Trockentransformators), Milan Vidmar. Elektrotechnische Zeitschrift, vol. 40, no. 15, Apr. 10, 1919, pp. 164-167, 5 figs. Discussing inner and outer heat currents, surface heat of coils. Comparison of vertical and horizontal column transformers.

Rectifiers, Mercury-Vapor Arc

Shape of Curve of Current and Tension in Mercury-Vapor Arc Rectifiers for Single-Phase Alternating Current (Ueber die Kurvenform des Stromes und der Spannungen an Quecksilberdampf-Gleichrichtern für Einphasen-Wechselstrom), Hans Nielsen. Elektrotechnische Zeitschrift, vol. 40, no. 20, May 15, 1919, pp. 224-227, 3 figs. Special formulæ for rectifiers without a. c. choking coil. Method is shown for simplified calculation of approximate size of a. c. choking coil.

Tank for Static Transformers

A New Form of Tank for Static Transformers, W. S. Moody. Gen. Elec. Rev., vol. 22, no. 10, Oct. 1919, pp. 756-759, 9 figs. Also in Elec. Rev., vol. 75, no. 16, Oct. 18, 1919, pp. 651-653, 7 figs. How conservator type reduces to minimum possibility of moisture entering, removes any combustible gases as soon as formed, and prevents hot oil from coming into contact with air.

Transformers, Limiting Sizes

Large Power Transformers, A. G. Ellis and J. L. Thompson. Elecn., vol. 83, nos. 2156 and 2157, Sept. 12 and 19, 1919, pp. 276-278 and 296-298, 6 figs. Limiting sizes of transformers as effected by handling and cooling are discussed, and prices per kilovolt-ampere in relation to output, voltage and cooling are presented. Conditions affecting choice of types and relative advantages of shell and core transformers are dealt with. (To be concluded.)

Transformer, Special

Special Transformer Delivers Arc Voltage. C. J. Holslag. Blast Furnace & Steel Plant, vol. 7, no. 10, Oct. 1919, pp. 487-488, 4 figs. Electric Arc Cutting Welding Company portable machine weighing 260 lb. Voltage increase accompanied by corresponding ampere decrease keep heat automatically constant.

TRANSMISSION, DISTRIBUTION, CONTROL

Benzinoform in High Tension Switches

Benzinoform in High-Tension Oil-Break Switches, M. Vogelsang. Sci. Am. Supp., vol. 88, no. 2282, Sept. 27, 1919, pp. 194-195. Some recently revealed German experiences with substitute materials. From Elektrotechnische Zeitschrift.

Cable-Fault Location

New Method for Locating Cable Faults (Ein neues Verfahren zum Auffinden von Kabelfehlern), Erwin Wurmbach. Elektrotechnische Zeitschrift, vol. 40, no. 19, May 8, 1919, pp. 211-212, 2 figs. Method consists in observing direction of a d. c. artificially sent through a cable armature by means of very sensitive instrument located at opposite ends of place where trouble occurs.

Conductor Supports

Generating and Sub-Station Conductor Supports, J. P. Collopy. Power Plant Eng., vol. 23, no. 19, Oct. 1, 1919, pp. 868-869, 5 figs. Types and methods utilized to insure safety and continuity of service.

High-Tension Networks

High-Tension Alternating-Current Underground and Over-Head Network (Canalisations souterraines et aériennes à haute tension à courant alternatif), W. Kummer. Revue Générale de l'Electricité, vol. 6, no. 13, Sept. 27, 1919, pp. 415-417, 2 figs. Curves showing diameter of conductor in terms of tension by reference to lead shell; also characteristic curves of underground cable of 100 mm. total diameter having only one conductor of 36 mm. diameter. From Schweizerische Bauzeitung.

Overload Control

Preventing Overloads on Steel-Mill Motors, P. M. Lincoln. Blast Furnace & Steel Plant, vol. 7, no. 10, Oct. 1919, pp. 496-497, 3 figs. Description of ammeter depending on temperature for its indications and having the same mass-ventilation ratio as mill motor to be protected against overload. Paper read before Assn. of Iron & Steel Elec. Engrs.

Electric-Machinery Control. Engineering, vol. 108, no. 2800, Aug. 19, 1919, pp. 274-276, 3 figs. Types built by Igranic Elec. Co., Lond., notably magnetic lock-out "clapper" switch, chief feature of which is that two independent magnetic circuit coils are provided, a central big coil for operating switch and a lower boxed-in coil for effecting lock-out.

Overload Protection

Influence of Characteristics of Overload Release on the Overload Protection of entire Systems (Ueber den Einfluss der Charakteristik von Ueberstromauslösern auf den Ueberstromschutz ganzer Netze), Georg Gorman. Elektrotechnische Zeitschrift, vol. 40, no. 25, June 19, 1919, pp. 297-299, 12 figs. Detailed discussion of characteristics and possible characteristics of overload releases. Deductions are made for the interconnection of several systems.

Poles

Method of Calculating the Class and Number of Poles required for Telegraph and Telephone Lines, Stanley Rhoads. Telegraph & Telephone Age, vol. 37, no. 19, Oct. 1, 1919, pp. 478-483. Method of calculating applies to straight away ("tangent") pole lines. Corners and terminals are special cases. Storm guys are assumed to strengthen and stiffen only pole to which attached and are designed to prevent swaying of line; line is designed with desired factor of safety without them.

Reinforced Concrete Bases for Poles. Telephone Engr., vol. 22, no. 4, Oct. 1919, pp. 13-14, 4 figs. Structure comprises ordinary wooden pole or shaft concrete base and iron socket for union between base and shaft.

Substations

Outdoor Substations in Connection with Coal-mining Installations, H. W. Young. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1883-1894, 9 figs. Instances illustrating recent developments in design.

Outdoor Substations in Connection with Coal-Mining Installations, H. W. Young. Elec. Rev. (Chicago), vol. 75, no. 15, Oct. 11, 1919, pp. 595-598, 6 figs. General requirements and station design, with notes on high-tension current control.

Transmission Line Calculation

Practical Calculations of Electric Transmission Lines (Calcul practique des lignes de transmission de l'énergie électrique), Revue Générale de l'Electricité, vol. 6, no. 13, Sept. 27, 1919, pp. 395-400, 4 figs. Formulæ for selection of most economical tension. Third article. Preceding articles appeared in R. G. E., Apr. 7 and Nov. 10, 1917.

Transmission Line Capacity

Methods of Increasing Capacity of Existing Tranmission Lines, E. C. Stone. Elec. Rev. (Chicago), vol. 75, no. 14, Oct. 4, 1919, pp. 562-566, 5 figs. Discussing line limitations and determination of relative costs of increasing capacity. Paper read before Pennsylvania Assn.

Transmission Line, High Tension

High-Tension Lines—II (Hochspannungsleitungen), W. Petersen. Elektrotechnische Zeitschrift, vol. 40, no. 13, Apr. 3, 1919, pp. 152-156, 13 figs. Comparison of various types; influence of temperature; excess voltage and influence of temperature; excess voltage and grounding. (Concluded.)

VARIA

Electromagnet, Plunger

On the Preliminary Calculation of the Characteristics of an A. C. Plunger Electromagnet, N. Hanada (in Japanese). Denki Gakkwai Zasshi, no. 374, Sept. 10, 1919.

See also Solenoids.

Japan

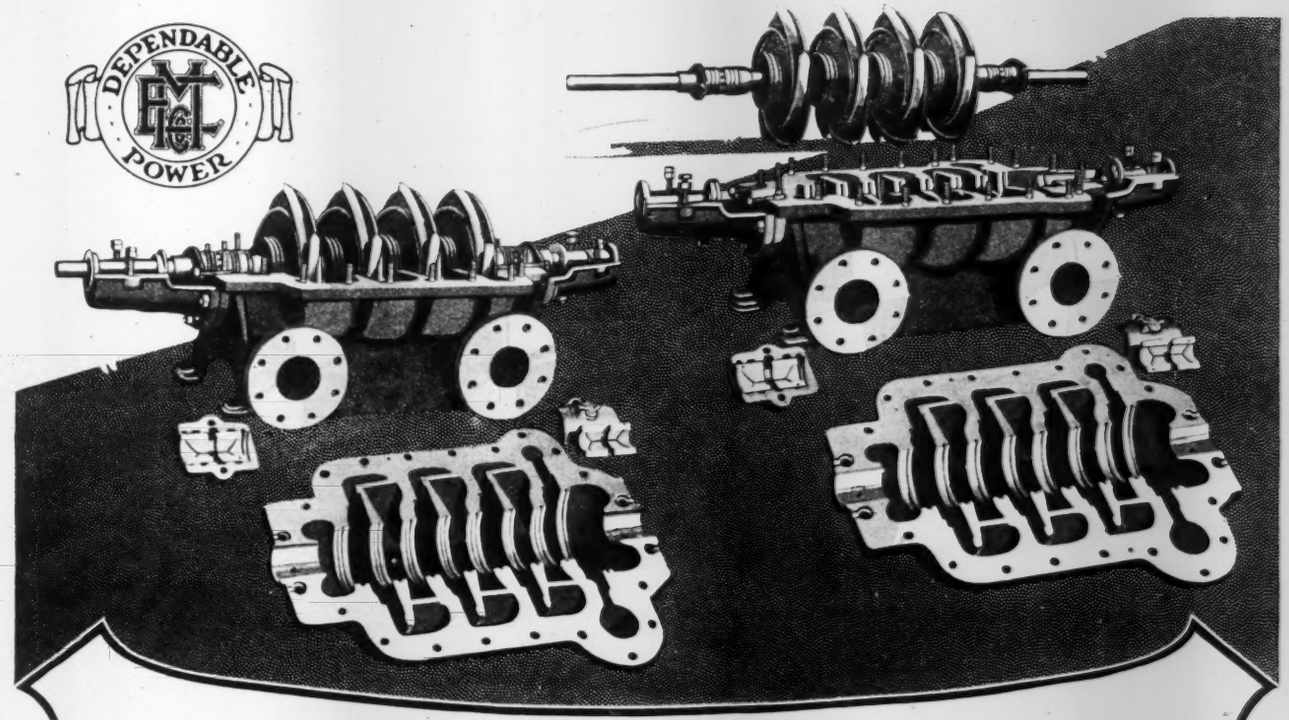
Statistical Report of Electric Undertakings in Japan. Direction General of Electric Exploitations, Dept. of Communications, Tokyo, Japan, June 1919, 20 pp. Summary of statistics showing conditions of existing electric undertakings in Japan at end of 1917, except in Formosa, Corea, Saghalin and Kwantung.

Shock, Electric

How to treat Persons suffering from Electric Shock (Secours aux personnes frappées par le courant électrique). Electricien, vol. 48, no. 1231, Aug. 1, 1919, pp. 73-75, 2 figs. Apparatus for producing artificial respiration.

Solenoids

On the Solenoid with Rectangular Cross Section, Y. Niva (in Japanese). Denki Gakkwai Zasshi, no. 374, Sept. 10, 1919.



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Civil Engineering

BRIDGES

Bear River Bridge

The Construction of the Bear River Bridge. Jl. Eng. Inst. Can., vol. 11, no. 10, Oct. 1919, pp. 658-662, 5 figs. It consists of thirteen spans, varying in length from 50 ft. to 156 ft., carried on concrete piers resting on pile foundations with exception of 3 piers which rest on bed of coarse gravel and boulders.

Headgates with Bridge

Headgates Combined with Bridge over Aqueduct Canal. Eng. News-Rec., vol. 83, no. 13, Sept. 25, 1919, pp. 610-611, 5 figs. Heavy reinforced-concrete structure in three spans with stoney gates closing waterways 57 ft. wide and 17 ft. high.

Load Concentration, Wood-Floor Bridge

Load Concentrations on Steel Floor-Joists of Wood Floor Highway Bridges. Eng. & Contracting, vol. 52, no. 17, Oct. 22, 1919, pp. 466-467, 5 figs. Results of investigation made by Iowa State College of Agriculture and Mechanic Arts to determine manner in which heavy wheel loads such as those of traction engines are distributed to the various I-beams and channel joists in a highway bridge floor system consisting of I-beams and channel joists and wood planking.

Pontoons

Concrete Pontoons in the Panama Canal Zone. Shipbuilding & Shipping Rec., vol. 14, no. 13, Sept. 25, 1919, pp. 347-348, 5 figs. General arrangement and particulars of four reinforced concrete pontoons for supporting gangways at Balboa.

Spans, Best Number

Economic Comparison of Engineering Projects—I, George Higgins. Commonwealth Engr., vol. 6, no. 11, June 1, 1919, pp. 344-346, 3 figs. Illustrated in problem of determining best number of spans for a viaduct of given length and height, assuming financial conditions to be the only ones that influence decision.

BUILDING AND CONSTRUCTION

Churches

St. Augustine's Church. Contract Rec., vol. 33, no. 43, Oct. 22, 1919, pp. 982-983, 1 fig. Foundations are to be of concrete and exterior of rubble course stone backed with 8-in. brick and 4-in. terra cotta with Montreal limestone trimmings.

Cost-Plus-Fee Contract

Building Construction Under the Cost-Plus-Fixed-Fee Contract, A. E. Wells. Heat. & Vent. Mag., vol. 16, no. 10, Oct. 1919, pp. 27-29. Coöperation among owner, architect and builder said to be insured by this form of building contract.

Gypsum Plant

Planning Construction of Gypsum Plants, Curtis F. Columbia. Cement, Mill & Quarry, vol. 15, no. 6, Sept. 20, 1919, pp. 21-24, 5 figs. Brief discussion of various types of buildings which comprise usual large gypsum plant, including power plant, water supply, fireproofing and heating and ventilation.

Machinery in Buildings

Critical Speeds of Machinery Placed on Upper Floors of Buildings, as related to Vibration, A. B. Eason. Lond., Edinburgh and Dublin Phil. Mag., vol. 38, no. 225, Sept. 1919, pp. 395-402, 4 figs. Analytical discussion of system consisting of motor resting upon elastic supports upon floor capable of deflection.

Pile Renewal in Trestles

Renewing Piles in Timber Trestles, Geo. W. Rear. Ry. Maintenance Engr., vol. 15, no. 10, Oct. 1919, pp. 340-341, 1 fig. Discussing diversity in character of equipment, organization of crews and methods of doing work.

Roofing

Proper Methods of Applying Roofing on a Gypsum Roof Deck, Curtis F. Columbia. Eng. & Contracting, vol. 52, no. 17, Oct. 22, 1919, pp. 457-459, 7 figs. Comparative advantages of "poured roof" and "precast tile."

CEMENT AND CONCRETE

Adherence of Concrete to Steel

Research on Adherence of Concrete to Steel in Reinforced Concrete Structure (Recherches sur l'adhérence du béton aux armatures dans les constructions en béton armé), M. Mercier. Annales des Ponts et Chaussées, vol. 50, no. 3, May and June 1919, pp. 370-374, 2 figs. It is concluded that adherence is due to special property of cement. Concrete used was made of 300 kg. of portland cement, 400 l. of sand and 800 l. of gravel. After ninety days it showed adherence of 6.5 kg. per sq. cm.

Beams

Concrete Arched Beams and Open Girder Carry Roof of Toronto Theatre. Contract Rec., vol. 33, no. 42, Oct. 15, 1919, pp. 953-954, 4 figs. Roof and balcony are built in reinforced concrete on Hennebique system.

Burnt Earth Concrete

Burnt Earth Concrete with Iron and Wood Reinforcement, L. P. Hodge. Engineering, vol. 108, no. 2801, Sept. 5, 1919, pp. 302-304, 10 figs. Tests of burnt earth concrete beams lead to conclusion that well burnt earth can be substituted for stone in concrete with safety and advantage when cost of stone is prohibitive.

Cold-Weather Concreting

Concreting in Cold Weather Offers Strong Advantages to Owners, A. E. Wells. Can. Engr., vol. 37, no. 17, Oct. 23, 1919, pp. 411-412. Outline of plant layout for winter.

Concrete Roofing Tile

Manufacture of Large Concrete Roofing Tile. Concrete, vol. 15, no. 4, Oct. 1919, pp. 157-159, 9 figs. Method of manufacturing slabs for roof purposes, pitched interlocking tile, flat slabs and channel slab.

Concrete Storage

Warehouse for Concrete and Lime Storage. Concrete, vol. 15, no. 4, Oct. 1919, pp. 154-156, 5 figs. Plan and construction details of structure built for Superior Sand & Gravel Co., Detroit.

Electrolysis

Electrolysis in Concrete, E. B. Rosa, Burton McCollum and O. S. Peters. Tech Papers Bur. Stand., no. 18, Aug. 1, 1919, 141 pp., 31 figs. Laboratory and field investigations relating to nature and cause of phenomena produced by passage of electric currents through concrete, undertaken with view to establish probable extent of danger in practice and circumstances under which trouble is most likely to occur. Specific recommendations are offered in regard to mitigating trouble from this source.

Graphic Tables

Graphic Table for Dimensioning of Reinforced Concrete Slabs for n=20 (Graphische Tabelle zur Dimensionierung einfach armierter Eisenbeton-Platten für n=20), R. Forter. Schweizerische Bauzeitung, vol. 74, no. 9, Aug. 30, 1919, pp. 105-107, 1 fig. Table devised for dimensioning or testing reinforced concrete slabs, eliminating all formulæ.

Gunite

Guniting Piling, Harry B. Sewall. Stone & Webster Jl., vol. 25, no. 4, Oct. 1919, pp. 292-294, 14 figs. on 7 supp. plates. Illustrating work of guniting piling of water front trestle on Bellingham Division of Puget Sound Traction, Light and Power Co.

Naval Construction

Properties of Reinforced Concrete Used in Naval Constructions (Les propriétés du béton armé employé dans les constructions navales), M. Poncet. Génie Civil, vol. 75, no. 1936, Sept. 20, 1919, pp. 266-271, 15 figs. Experiments to determine imperviousness to water and petroleum of concrete, both alone and after being painted with various preparations.

Permeability

Permeability of Concrete, S. Bowman. Jl. Soc. Chem. Indus., vol. 38, no. 17, Sept. 15, 1919, pp. 325R-327R, 1 fig. Method of investigating (1) comparative merits of various waterproofing agents, (2) effect of such compounds on chemical and physical properties of Portland cement and reinforced concrete, and (3) economic aspect of use of such compounds.

Scottish Mode for Measuring Concrete

The Scottish Mode for Measuring Concrete. Contract Rec., vol. 33, no. 42, Oct. 15, 1919, pp. 962-965. Rules applying to taking off of quantities. Established as part of National Building Code of Scotland.

Slag Aggregates

Slag Aggregates in Concrete and Mortar, Emmanuel Mavaut. Iron & Steel of Can., vol. 11, no. 9, Oct. 1919, pp. 232-235, 5 figs. Report of comparative tests of basic steel, slag, limestone and banc rouge used as coarse aggregates in concrete, also basic steel slag screenings, commercial and standard sands used as fine aggregates.

Wood Reinforcement for Concrete

Wood as Reinforcement for Concrete. Eng. & Contracting, vol. 52, no. 18, Oct. 29, 1919, p. 505, 2 figs. Table showing relative strength of beams of wood, wood concrete and reinforced concrete. (From Beton und Eisen.)

EARTHWORK, ROCK EXCAVATION, ETC.

Concrete Block Tunnel

Concrete Block Tunnel at River Rouge, Michigan. Bulletin of Genrl. Contractors Assn., vol. 10, no. 8, Aug. 1919, pp. 148-149, 2 figs. O'Rourke interlocking concrete blocks, 18 in. in thickness, used.

Hydraulic Fill Dams

Methods of Constructing Hydraulic Fill Dams of Miami Conservancy District. Eng. & Contracting, vol. 52, no. 16, Oct. 15, 1919, pp. 432-435, 6 figs. Noting specially stream control and features of retarding basin dams. Paper read before New England Waterworks Assn.

Pipe Lines, Underground

A New Method of Installing Underground Pipe Lines, John C. White. Wisconsin Engr., vol. 24, no. 1, Oct. 1919, pp. 12-15, 5 figs. Worked out by Dept. of Eng. of State of Wisconsin.

Safety Measures

Safety Measures in Excavating Operations. Contract Rec., vol. 33, no. 40, Oct. 1, 1919, pp. 927-928. Precautionary steps for prevention of accidents in excavation work and proper methods of handling equipment.

Tunnels

Some Tunnels in India. Ry. Engr., vol. 40, no. 477, Oct. 1919, pp. 212-216, 10 figs. Constructional details of tunnel 5704 ft. long. (Continuation of serial.)

HARBORS

Turning Basin

Turning Basin and Ship Channel in Toronto's New Industrial Area. Contract Rec., vol. 33, no. 43, Oct. 22, 1919, pp. 975-978, 5 figs. Improvements to Toronto Harbor include provision of a water frontage for industrial sites. Walls of basin and channel were built of concrete on piles, site having been exposed by sand-fill cofferdam.

RECLAMATION AND IRRIGATION

Drainage, Electric

Electric Drainage in Holland (Electrische Bemalingsinrichting voor het Boezemwaterschap Electra). Ingenieur, vol. 34, no. 31, Aug. 2, 1919, pp. 570-571. How district is drained by three stork screw-propeller pumps each having capacity of 209,000 gal. per min. Pumps are driven by 2000-volt three-phase 550-hp. motors.

Irrigation, Cost

Cost of Engineering Work for Maintenance and Operation of large Irrigation Project, H. M. Chadwick. Eng. & Contracting, vol. 52, no. 15, Oct. 8, 1919, pp. 418-419, 2 figs. Engineering order system evolved, operating Valley project, which permitted each job to be covered by an engineering order showing number, canal, reservoir, structure or land involved, class of work and information regarding necessity of survey.

South Africa

Union Irrigation Works and Projects—IV, South African Jl. Industries, vol. 2, no. 7, July 1919, pp. 663-672, 1 fig. Upper Modder River Conservation Scheme; details of catchment area, dam and reservoir site; geological description of site. (Concluded.)

ROADS AND PAVEMENTS

Aggregate Field Testing

Testing Aggregates in the Field, F. H. Jackson. Public Roads, U. S. Dept. Agriculture, Bur. Public Roads, vol. 2, no. 15, July 1919, pp. 11-13. Outfit developed by Bur. of Public Roads, for making field analysis of aggregates, together with suggested methods for its use.

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Asphalt Macadam Pavements

Recommended Procedure in the Design, Construction and Maintenance of Asphalt Macadam Pavements, Prevost Hubbard. Mun. & County Eng., vol. 57, no. 4, Oct. 1919, pp. 152-156. Calls emphasis especially to importance of attending to details, that is, following rule of constructing "asphalt macadam by square yard and not by the mile."

Bitoslag Pavements

Characteristics of Bitoslag Pavement, J. R. Draney. Mun. & County Eng., vol. 57, no. 4, Oct. 1919, pp. 156-157. Bitoslag is pavement composed of specially prepared asphalt and finely crushed slag combined with filler and mixed in regular asphalt paving plants. It is laid to depth of not less than 2 in. in thickness after compression.

Brick Pavements

Resurfacing Old Brick Pavement. Mun. Jl. & Public Works, vol. 47, no. 13, Sept. 27, 1919, pp. 196-198, 3 figs. Method of preparing old pavement for new surface; handling traffic during construction.

Contract Awards

Should Contracts for grading upon extensive Highway Improvements be awarded separately? Eng. & Contracting, vol. 52, no. 14, Oct. 1, 1919, pp. 389-390.

Curvature, Continuous in Roads

Design of Roads with Continuous Curvature (Tracés de routes à courbure continue), Ch. Galatoire-Malegarie. Annales des Ponts et Chaussées, vol. 50, no. 3, May and June 1919, pp. 332-362, 13 figs. By continuous curvature is meant smoothed-out curve when radii of components are less than 30 m. How to do this by Bernoulli's lemniscate is shown in article.

Foundations

The Construction of Portland Cement Concrete Pavement Foundations, James W. Routh. Mun. & County Eng., vol. 57, no. 4, Oct. 1919, pp. 169-171, 6 figs. Illustrating methods of carrying out the various operations.

Granite-Block Pavements

How to Secure Best Results in Construction of Improved Granite Block Pavements. Eng. & Contracting, vol. 52, no. 14, Oct. 1, 1919, pp. 382-385. Standard sizes of blocks, laying of blocks, concrete base, sand or mortar cushion, ramming and grouting are among features discussed.

Road Impact Test

First Reports on Road Impact, E. B. Smith. Power Wagon, vol. 23, no. 179, Oct. 1919, pp. 27-29, 3 figs. Studies to determine destructive effect of heavily loaded motor trucks on highways and streets undertaken by Bureau of Public Roads at Arlington experimental farm.

See also MECHANICAL ENGINEERING, Motor-Car Engineering, Impact of Trucks and Roads.

Water Pockets in Roadbed

Means for Prevention or Cure of Water Pockets in Roadbed. Bul. Am. Ry. Eng. Assn., vol. 21, no. 217, July 1919, pp. 9-10. Recommendations proposed by Committee of Am. Ry. Eng. Assn.

SANITARY ENGINEERING

Refuse Collection

Street Cleaning and Refuse Collection in Newark. Mun. Jl. & Public Works, vol. 47, no. 13, Sept. 27, 1919, pp. 200-202, 1 fig. Details of collection service, records of men and teams employed, amount and nature of work performed and personal efficiency. (Continued from p. 182.)

Sewer Inlets

More Engineering on Sewer Inlets, W. W. Horner. Mun. & County Eng., vol. 57, no. 4, Oct. 1919, pp. 147-150, 14 figs. Account of research work made by St. Louis engineers to determine intake capacity of different style inlet under various conditions of installation and particularly intake capacity of double inlet.

Sewage Treatment

Operating Results of "Direct Oxidation" Experimental Sewage Treatment Plant at Easton, Pa. Can. Engr., vol. 37, no. 16, Oct. 16, 1919, pp. 389-393, 395 and 396. It was determined that combined action upon sewage of fine screen lime treatment and electrolytic cell rendered sewage in such a condition that after sedimentation in properly designed tanks affluent could be discharged into stream affording reasonable dilution of relatively clean water without danger of creating nuisance.

Sewers, Odors

Causes of Offensive Odors from Sewers and Remedial Measures, Edward B. Savage. Eng. & Contracting, vol. 52, no. 18, Oct. 29, 1919, pp. 511-512. Based on anemometer and other tests of ventilation system. Paper read before Inst. of Mun. and County Engrs.

WATER SUPPLY

Coagulating Basins

Some Observations and Experiences in the Operation of Coagulating Basins, James Wadsworth Armstrong. Can. Engr., vol. 37, no. 17, Oct. 23, 1919, pp. 405-407, 5 figs. Account of current measurements made with aluminum floats, readings of which were taken every five minutes.

Feedwater Treating

Feed-Water Treating and Purifying Plant for the Republic Iron & Steel Company, Youngstown, Ohio, S. H. McKee. Proc. Engrs., Soc. Western Pa., vol. 35, no. 6, July 1919, pp. 283-301 and (discussion) pp. 302-309, 7 figs. Plant has treating capacity of 300,000 gal. per hr. and is laid out to permit 25 per cent extension.

Filtered Sand

Purification Effected by Mechanical Drifting Sand Filtration in Toronto, Norman J. Howard. Contract Rec., vol. 33, no. 41, Oct. 8, 1919, pp. 937-943; Can. Engr., vol. 37, no. 14, Oct. 2, 1919, pp. 342-345 and Eng. & Contracting, vol. 52, no. 15, Oct. 8, 1919, pp. 402-404, 15 figs. Average reduction said to have been 85.4 per cent in total bacteria and 94.8 per cent in b. coli during year 1918; chlorination killed practically all remaining bacteria.

Metalium Joints

Methods of Effecting Economies in Water Works Operation, Homer V. Knouse. Eng. & Contracting, vol. 52, no. 15, Oct. 8, 1919, pp. 405-406. Suggests special rigs and methods of handling work and use of metalium as jointing for pipe lines.

Water-Works Reconstruction

How to Reconstruct Small Water-Power Plants, Ray K. Holland. Mun. & County Eng., vol. 57, no. 4, Oct. 1919, pp. 180-182. Examples of plant reconstruction.

WATERWAYS

Stream Pollution

Stream Pollution and Its Relation to the Chemical Industries, Earle B. Phelps. Jl. Indus. & Eng. Chem., vol. 11, no. 10, Oct. 1, 1919, pp. 928-929. Suggests desirability of federal control of stream pollution under conditions that will permit of adequate scientific study of problems involved and of correlation of these problems with those of public health, navigation, fisheries, and other matters related to waterways.

HYDRAULIC ENGINEERING

Floods

Technical Study of the Propagation of Floods (Etude sur le mouvement graduellement varié non permanent et la propagation des crues), Edmond Maillet. Annales des Ponts et Chaussées, vol. 50, no. 3, May and June 1919, pp. 289-331, 8 figs. Derivation of Baumgarten law.

Water Storage

The General Principles of the Development and Storage of Water for Electrical Purposes, J. W. Meares. Engineering, vol. 108, no. 2799, Aug. 22, 1919, pp. 258-260, 5 figs. Comparative study of cost, both of installation and maintenance, of hydroelectric schemes and power house and steam power house. (Concluded.)

MUNICIPAL ENGINEERING

City Planning

The Planning of Residential Suburbs with Special Reference to Engineering Features, F. L. Olmsted. Mun. & County Eng., vol. 57, no. 4, Oct. 1919, pp. 161-164. Residential neighborhood plan under direction of U. S. Housing Corporation offered as example of engineering development.

Street Planning

Rules of Practice for the Establishment of Street Widths and their Subdivisions, B. A. Haldeman. Can. Engr., vol. 37, no. 17, Oct. 23, 1919, pp. 409-410. Practice suggested by Zoning Commission, Philadelphia, Pa.

Zoning

Zoning, Edward M. Bassett. Can. Engr., vol. 37, no. 17, Oct. 23, 1919, pp. 410-411. Writer is chairman of zoning committee of New York City.

Mining Engineering

BASE MATERIALS

Clays

Clays and Shales of Minnesota, Frank F. Grout. Dept. of Interior, U. S. Geol. Survey, bul. 678, 1919, 259 pp., 38 figs. Object of investigation was to examine brick supply for every town of 1000 or more inhabitants and for every county in the state, to ascertain extent of various deposits now developed, to find new deposits, and to determine qualities of these deposits and of certain mixtures with a view to finding out whether it is possible to produce refractory wares, pottery, paving brick, and other high-grade products.

Clay Products Statistics in 1918. Cement, Mill & Quarry, vol. 15, no. 6, Sept. 20, 1919, pp. 41-43. Unusual conditions last year resulted in restricted operation of clay working industries, with consequent decrease in production.

Gravel

New Gravel Plant on Puget Sound, W. A. Scott. Cement, Mill & Quarry, vol. 15, no. 6, Sept. 20, 1919, pp. 11-13, 4 figs. Describing modern features at recently completed sand and gravel works of Independent Asphalt Paving Co., Seattle, Wash.

Phosphates

Investigation of a Reported Discovery of Phosphate in Alberta, Hugh S. de Schmid. Can. Dept. Mines, Mines Branch Bul. no. 12, 1916, 38 pp., 14 figs. partly on supp. plates. Area examined; nature of phosphate; analyses of samples of phosphate; results of examination of Rocky Mountain quartzite for phosphatic horizons; economic importance of deposits.

Coral Island Phosphates in the Making, F. Danvers Power. Bul. Instn. Min. & Metallurgy, no. 181, Oct. 16, 1919, 10 pp., 8 figs., on four supp. plates. Different shaping between phosphate deposited by animal or chemical means.

COAL AND COKE

Chemistry of Coal

Researches on the Chemistry of Coal—I. The Action of Pyridine upon the Coal Substance, William A. Bone and Reginald J. Sarjant. Proc. Roy. Soc., vol. 96, no. A-675, Sept. 4, 1919, pp. 119-136, 3 figs. Account of research carried out in Departments of Chemical Technology at Imperial College of Science and Technology, with object of clearing up various claimed discrepancies in work of previous investigators.

Coal Stocking

Coal Stocking and Reclaiming—I, II. Coal Trade Jl., vol. 50, nos. 40 and 44, Oct. 1 and 29, 1919, pp. 1195-1196 and 1266-1268, 7 figs. Oct. 1: Discusses deterioration in stocking, handling methods and machinery required. Oct. 29: Railroad large capacity plants are discussed.

Coal Washing

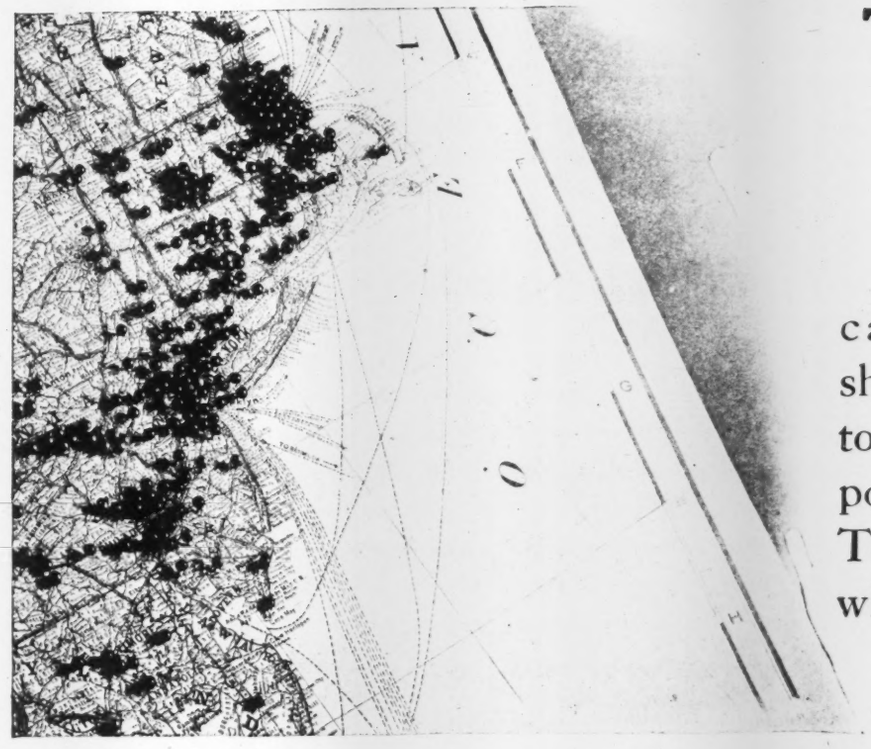
The Examination of Coal in Relation to Coal-Washing, M. Wynter Blyth and L. T. O'Shea. Trans. Instn. Min. Engrs., vol. 57, no. 5, Sept. 1919, pp. 261-276 and (discussion) pp. 276-288. Suggested method of testing. Ash in washed coal is taken as standard of purity by which to judge its suitability for coke making.

Coke-Oven Practice

Some Economic Considerations in Coke Oven Practice, W. Colquhoun. Proc. Midland Inst. Min., Civil & Mech. Engrs., vol. 24, no. 7, Nov. 9, 1918, pp. 195-222 and (discussion) pp. 222-234, 6 figs. Comparison with beehive coke ovens develops that process of coking cannot be called economically perfect until, writer believes, some inventor devises more direct application of heat necessary to distill coal. General bibliography of technical articles on coking is appended.

Colliery Managers

The Education of Colliery Managers for Administrative and Social Responsibilities, William Maurice. Tran. Instn. Min. Engrs.,



That Feeling of Security

called confidence should be the final factor in the selection of power plant equipment. To sign a contract without it would be to admit you were taking a chance.

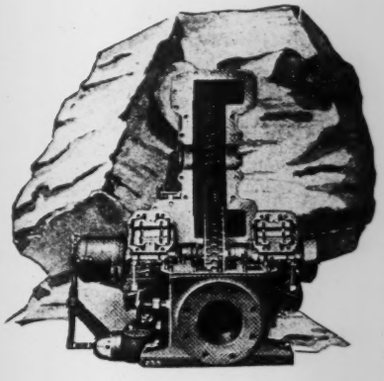
The pins in the map indicate towns or cities in which there are from one to two hundred Terrys each and, although this is a densely populated part of the country, less than one-tenth of all the Terrys are installed here Yet, if the Terrys in Massachusetts alone were evenly spaced over the State, you couldn't get more than a mile away from one. Because of this vast number of Terry installations, it is obvious that a man who specifies

THE TERRY TURBINE

for Generator, Blower or Pumping units knows that he is not taking a chance. He is following the good judgment of thousands of engineers who know by experience what Terry service means. There is a sphinx-like stolidity behind equipment used so extensively which brings that feeling of security to the man who specifies Terry

Select your equipment with confidence.

Specify Terry



T-657

The Terry Steam Turbine Co.
Terry Square, Hartford, Conn.

vol. 57, no. 5, Sept. 1919, pp. 289-296 and (discussion) pp. 296-299. Importance of training colliery managers argued because of exceptional position in which they are placed, as illustrated by statistics which show that 1500 managers control over 1,000,000 miners, these figures being interpreted as indicating extent of national influence that could be exerted if every manager made a point of rendering whatever form of social service was compatible with his temperament and abilities.

Fire Prevention

Fire Prevention in Anthracite Mines, M. W. Price. Coal Industry, vol. 2, no. 10, Oct. 1919, pp. 469-470. Equipment necessary for fighting mine fires and plans for organizing fire fighting squads at mining camps. Paper presented at 8th Annual Safety Congress.

Large-Scale Production

Engineering Features of Modern Large Coal Mines in Illinois and Indiana, C. A. Herbert and C. M. Young. Bull. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2445-2473, 10 figs. Important feature of development is production of coal by large consumers. Six mines planned for outputs of 6000 to 8000 tons per 8-hr. day are selected for discussion as exemplifying best practice in coal-mine engineering in central district at present time.

Low-Temperature Coking

New Method of Coking at Low Temperatures (Ueber eine neue zweckmässige Art der Durchführung der Tieftemperatur-Verkokung), Franz Fischer and W. Gluud. Berichte der deutschen chemischen Gesellschaft, vol. 52, no. 6, 1919, pp. 1035-1039, 2 figs. Rotating cylinder used for distillation.

Power Plants

Some Useful Instruments for Colliery Power Plants, H. W. Ravenshaw. Proc. Midland Inst. Min., Civil & Mech. Engrs., vol. 24, no. 5, Mar. 9, 1918, pp. 141-151, 9 figs. D. c. and a. c. leakage recorders, over-volt vacuum-breaker, continuous steam engine indicator and apparatus for measuring orifices.

Purification of Coal

Purification of Coal, B. J. Roberts. Power Plant Eng., vol. 23, no. 20, Oct. 15, 1919, pp. 906-908. Concentration table method and results obtained.

Research

Research in the Coal-mining Industry, E. A. Holbrook. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1723-1737. Possible fields of research are pointed out, notably as to resources, origin, occurrence, constitution, development and exploitation.

Retort Tests

Experimental-Retort Tests of Orient Coal, R. S. McBride and I. V. Brumbaugh. Coal Age, vol. 16, no. 14, Oct. 2, 1919, pp. 567-569, 3 figs. Experiments conducted at Bur. of Standards in order to determine effect of coking temperature upon quantity and quality of gas produced.

Spitzbergen

Coal and Iron from the Arctic, Harold J. Shenstonee. Sci. Am., vol. 120, no. 15, Oct. 11, 1919, pp. 362-363, 376 and 378, 5 figs. British syndicate reports finding iron mountain, 17 miles long, extensive coal beds and asbestos field at Spitzbergen.

Storage

A System of Storing and Filling Small Coal, with Remarks upon the Prevention of Spontaneous Heating in Coal-Heaps, John Morison. Trans. North of England Inst. Min. & Mech. Engrs., vol. 68, no. 5, Apr. 1918, pp. 154-157 and (discussion) pp. 157-164, 3 figs. System of stocking by means of traveling cranes in use at Cramlington Collieries.

Sulphur in Coal

Sulfur in Coal, Geological Aspects, Geo. H. Ashley. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 2073-2079. Modes of occurrence, and comparison of sulphur content in beds of various regions, noting how percentage of sulphur is controlled by conditions existing during laying down of each bed.

Forms in Which Sulfur Occurs in Coal, A. R. Powell and S. W. Parr. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 2041-2049, 2 figs. Synopsis of investigation published as Bul. 111 (1919) of University of Ill. Eng. Experimental Station.

Effect of Sulfur in Coal Used in Ceramic Industries, C. W. Parmelee. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1845-1850. Figures showing maximum percentage of sulphur permitted in coal used by various companies in pottery ovens for manufacturing various kinds of clay products. Objections to sulphur are clinkering of fuel in firebox, action of oxides of sulphur in waste-heat driers, and effect of oxides of sulphur on clays, glazes and colors during burning and unburned clay products.

Occurrence and Origin of Finely Disseminated Sulfur Compounds in Coal, Reinhardt Thiessen. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2431-2444, 10 figs. It is reported that all coals that have been examined microscopically contain microscopic grains of pyrite disseminated through them, which are distributed very irregularly and usually occur in colonies. Microscopic pyrites and organic sulphur in coal are accounted for by same reasoning; lenses, balls, and sheets of pyrite are believed to have secondary origin.

Sulfur in the Coking Process, S. W. Parr. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1807-1809. Organic sulphur in coal, which is for the most part discharged at relatively low temperatures, is not considered as responsible for formation of CS_2 in gases discharged from high-temperature coking process.

Mechanical Separation of Sulfur Minerals from Coal, J. R. Campbell. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1779-1789, 4 figs. Plant where elimination of sulphur is accomplished by jigging in water and concentrating tables.

Testing of Coal

Testing of Coals for By-product Coking and Gas Manufacture, Horace C. Porter. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1587-1595, 3 figs. Writer believes it is possible by careful control of conditions, to judge both coking quality and by-product yields by laboratory carbonizing tests, giving weight in this judgment to approximate analysis of coal, nature of its volatile matter and its geologic history. Such a test, he advises, should be made comparative by choosing standard coal for known commercial performance.

Thick-Seam Working

New Methods of Working Thick Seams of Coal, Dudley S. Newey. Iron & Coal Trades Rev., vol. 99, no. 2689, Sept. 12, 1919, pp. 324-326, 13 figs. Advantages claimed are: complete extraction of coal, gradual and diminished subsidence, greater safety and improved conditions of work for miners, control of excessive weight, as well as better supervision.

Washability

Some Factors that Affect the Washability of a Coal. Thomas Fraser and H. F. Yancey. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1817-1827, 3 figs. From investigation and experimental research it is formulated as principal condition that characterizes easily washed coal that excess undesirable sulphur and ash should be present in form of shale or pyrite particles large enough to be detachable from coal without crushing finer than ¼ in. in size.

Wedging Holes

Wedging Diamond-drill Holes, O. Hall and V. P. Row. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1597-1602, 2 figs. Mond Nickel Co. follows standard practice of wedging holes back to vertical or back to straight line as soon as they show deflection of over 3 deg. This is accomplished by means of wooden plug, drive wedge, pilot wedge, deflecting wedge, special clinometer and special reaming bit.

West Virginia

Geographic Distribution of Sulfur in West Virginia Coal Beds, I. C. White. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 2197-2206, 8 figs. Including maps showing how percentages of sulphur in W. Va. coal are distributed geographically over State.

EXPLOSIVES

Shipping Containers

Shipping Containers, C. P. Beistle. Jl. Soc. Chem. Indus., vol. 38, no. 17, Sept. 15, 1919, pp. 330T-337T, 1 fig. Origin and present status of efforts of Bur. of Explosives to permit safety in transportation of dangerous articles.

See also ORGANIZATION AND MANAGEMENT, Safety Engineering (Explosives).

GEOLOGY AND MINES

Alaska

Mining Methods of Alaska Gastineau Mining Co., G. T. Jackson. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1547-1570, 14 figs. Deposits worked consist of single band, several hundred feet wide, in which stringers and veins of quartz carrying gold occur in slate formation near its contact with some altered volcanic rock. Article includes description of combination of shrinkage caving method of stoping used.

Canadian Springs

The Chemical Character of Some Canadian Mineral Springs—II, R. T. Elworthy. Can. Dept. Mines, Mines Branch. Bul. vol. 20, no. 472, 1918, 173 pp., 12 figs., partly on supp. plates. Classification of waters and methods of analysis; description of springs and tabulated analyses; relation of chemical constituents to geologic formations; therapeutics of mineral waters and economic value of springs.

See also Radioactivity, Canadian Springs.

High Temperatures in Deep Mines

High Temperatures in Deep Mines, William Garforth. Proc. Midland Inst. Min., Civil and Mech. Engrs., vol. 24, no. 8, Oct. 17, 1918, pp. 235-241. Examination of committee reports of various scientific societies on effects of working in atmosphere of high temperature and study of present systems of haulage and methods of working in deep mines.

Huronian Group, Michigan

Correlation of Formations of Huronian Group in Michigan, R. C. Allen. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2579-2594, 1 fig. Proposed amendments to U. S. Geological Survey correlations, prepared by C. R. Van Hise and C. K. Leith, in Geology of the Lake Superior Region, U. S. Geol. Survey Monograph 52.

Mesabi Range

The Nature and Origin of the Biwabik Iron-Bearing Formation of the Mesabi Range, Minnesota, Frank F. Grout. Economic Geology, vol. 14, no. 6, Sept.-Oct. 1919, pp. 452-464, 8 figs. Discussing precipitation, conditions of deposition, texture of deposit, primary modification of deposit and metamorphism.

Radioactivity, Canadian Springs

The Radioactivity of some Canadian Mineral Springs, John Satterly and R. T. Elworthy. Can. Dept. Mines, Mines Branch, Bul. 16, no. 435, 1917, 55 pp., 23 figs. on supp. plates. Methods used for determination of radioactivity; detailed description of apparatus; relation between radioactivity and other properties; description of wells and springs in various districts.

IRON

Great Britain

Recent Iron-Ore Developments in the United Kingdom, F. H. Hatch. Geol. Mag., vol. 6, no. 9, Sept. 1919, pp. 387-397, 2 figs. Table showing relative production and iron-content of Jurassic ironstones; analyses; statistics of production during 1918.

LEAD, ZINC, TIN

Elmore Process

The New Elmore Process. Min. & Sci. Press, vol. 119, no. 14, Oct. 4, 1919, pp. 479-480. Invention relates to extraction and separation of lead and zinc from ores, concentrates, and the like, in which these metals associated together in form of sulphites. It consists in treating ore, etc., with certain acid agents whereby lead sulphide is converted into soluble lead compound while zinc sulphide remains substantially unattacked.

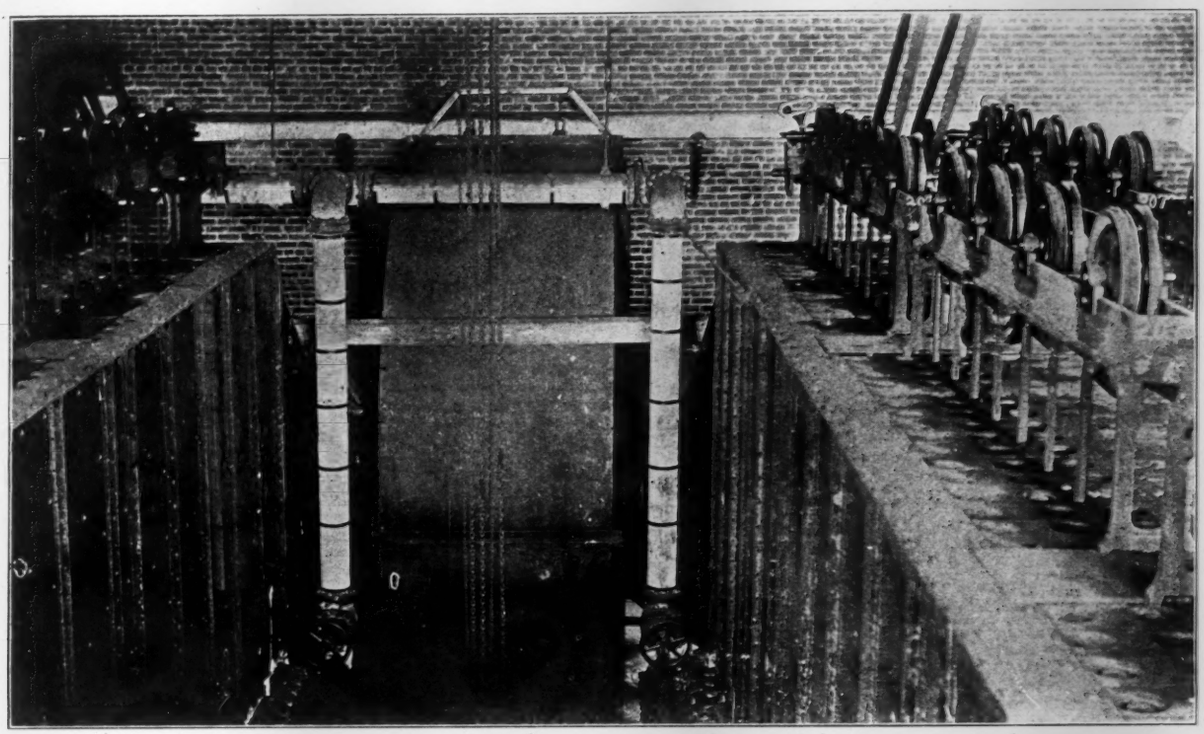
Slag Melting

Slag Melting at Lead Works at Babe, Serbia (Ueber das Schlackenschmelzen in der Bleihütte des einstigen k. u. k. Militärberghaues Babe in Serbien), Anton Lissner. Berg-und Hüttenmännisches Jahrbuch, vol. 67, no. 3, 1919, pp. 192-218, 6 figs. on supp. plate. Processes of melting, and results of operation.

Zinc Strip and Rod

Some Properties and Applications of Rolled Zinc Strip and Drawn Zinc Rod, C. H. Mathewson, C. S. Trewin and W. H. Finkeldey. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2775-2846, 57 figs. Survey of information on rolled zinc found in current literature, and study of characteristics of zinc from theoretical point of view. Several microstructures of typical specimens.

Textile Industrial Economy



American Woolen Co.'s Assabet Mills, Maynard, Mass., are using Three Green's Fuel Economizers, totaling 1856 tubes, and two Green's Hi-speed, Hi-efficiency Radial Flow Fans

GREEN'S FUEL ECONOMIZERS

shown above consist of two economizers, each composed of 520 nine-foot tubes. These two economizers operating in connection with three 950 H.P. Heine boilers, effect a rise of feed water temperature of 105°F. at rating and 104° at 300% of rating, corresponding to a fuel saving of 9.2%.

The third economizer consists of 816 nine-foot tubes and raises the feed water temperature from two 950 H.P. boilers 119° at rating and 123° at 300% of rating. The fuel saving being 10.4% and 10.8% respectively.

The induced draft for both of the above installations is furnished by two Green's Hi-speed, Hi-efficiency Radial Flow Fans.

Our engineers will be glad to figure the saving possible in your plant.

THE GREEN FUEL ECONOMIZER CO.

BEACON, N.Y.

MINES AND MINING

Cementation Process of Shaft Sinking

Cementation Process of Shaft Sinking. Iron & Coal Trades Rev., vol. 99, no. 2692, Oct. 3, 1919, pp. 440-441. Particulars of bore holes for cementation, walling and sinking, and statement of costs. Paper read before North Staffordshire Inst. Min. Engrs.

Cost Keeping

Cost Keeping for Mines—III, K. D. Armstrong. Chem. Eng. & Min. Rev., vol. 11, no. 131, Aug. 5, 1919, pp. 319-322. Suggested system for time keeping.

Foremen

Law and the Dual Duties of Mine Foremen, Joseph J. Walsh. Coal Indus., vol. 2, no. 9, Sept. 1919, pp. 378-379, 2 figs. Application of anthracite mining law and dual duties of mine foreman are discussed; writer claims that campaign of education and enforcement of law have not produced desired results.

Mine Valuation

The Federal Taxation of Mines—II, L. C. Graton. Min. & Sci. Press, vol. 119, no. 16, Oct. 18, 1919, pp. 567-570. Methods of mine valuation.

Pit Props

The Strength of Pit-Props, Fred L. Booth. Trans. North of England Inst. Min. & Mech. Engrs., vol. 68, no. 5, Apr. 1918, pp. 165-169 and (discussion) pp. 169-176. Tables given of results of tests of crushing strength of various sizes of pit-props.

Rescue-Training Standardization

Standardizing Mine-Rescue Training, D. J. Parker. Coal Industry, vol. 2, no. 10, Oct. 1919, pp. 474-475. Historical account of development of self-contained breathing apparatus, especially as modified by researches of Bureau of Mines, and discussion of desirability and plan of mine rescue training. Paper read before Eighth Annual Safety Congress.

Settling Sumps and Filters

Notes on the Settlement of Mine Water on the Witwatersrand, J. Whitehouse. Jl. South African Instn. Engrs., vol. 18, no. 1, Aug. 1919, pp. 8-22, 9 figs. Describes details of settling sumps and filters installed on Village Deep Mine, and some points concerning their operation.

Shot Firing

Electric Shot-Firing, MM. Taffanel, Dautriche, Durr and Perrin. Quarry, vol. 24, no. 272, Oct. 1919, pp. 273-276, 7 figs. Experiments undertaken to investigate intensity at which misfire may occur when detonators are ranged in series, effect of excessive voltage, alternating versus direct current and effect of earth contacts or shunts.

See also Explosives.

Timber Treating

The Preservation of Mine Timber, N. T. Williams. Trans. Manchester Geol. & Min. Soc., vol. 36, no. 4, Sept. 1919, pp. 79-87, 4 figs., partly on supp. plate. Illustrating operation of open-tank plant for treating timber in hot and cold baths.

OIL AND GAS

Bore Holes

Graphic Charts for Petroleum Bore-Holes, T. Sington. Engineering, vol. 108, no. 2801, Sept. 5, 1919, pp. 321-322. 1 fig. Illustrating system of daily record of progress made as well as of accidents, water eruption and other difficulties incidental to petroleum search, which cause delay.

Dehydration of Oil

Electrical Dehydration of Oil, H. N. Sessions. Jl. Electricity, vol. 43, no. 7, Oct. 1, 1919, pp. 316-318, 2 figs. Instances quoted where it is said installation of electrical dehydrators at wells resulted in tremendous saving in transportation cost.

Gasoline in Natural Gas

Gasoline in Natural Gas, D. B. Dowling. Can. Dept. Mines, Geological Survey, Summary Report, 1918, part C, pp. 17C-42C, 1 fig. Account of absorption tests on Alberta Gas.

Prospecting

Geologic Factors in Oil Prospecting, Frederic H. Lahee. Economic Geology, vol. 14, no. 6, Sept.-Oct. 1919, pp. 480-490, 5 figs. Geologic factors governing conclusions enumerated as follows: Classification of rock formation, thickness percentage of rock types, relation to original shore lines, reservoir or sand conditions, structural conditions, depth to possible oil-bearing horizons, carbon ratio. All these are discussed.

Shales

The Oil Shales of Northwestern Colorado, Bur. Mines of State of Colorado, bul. no. 8, 1919, 59 pp., 5 figs. Noting commercial possibilities and precautions that must be taken in mining, including geological notes and general bibliography on oil shale industry.

Valuation of Oil Properties

Essential Factors in Valuation of Oil Properties, Carl H. Beal. Bull. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2219-2227. Factors discussed are (1) amount of oil property will produce, (2) amount of money this oil will bring, (3) development and production costs, (4) rate of interest on investment, (5) amortization of invested capital, and (6) scrap value of equipment when property is exhausted.

Metallurgy

ALUMINUM

Research

Aluminum Research (Untersuchungen über Aluminium), W. Jaeger and K. Scheel, and L. Holborn. Elektrotechnische Zeitschrift, vol. 40, no. 14, Apr. 3, 1919, pp. 150-152, 5 figs. Observations on the specific resistance and its temperature coefficients, on thermic expansion and tensile strength. The resistance coefficient in its relation to the structure and the chemical purity of aluminum.

IRON AND STEEL

Acid-Furnace Structure

The Action of Iron Oxides Upon the Acid-Furnace Structure, J. H. Whiteley and A. F. Hallimond. Iron and Steel Inst., meeting of Sept. 1919, paper no. 13, 21 pp., 10 figs. on 2 supplement plates. Method is outlined by which comparative amounts of oxides present in gases at various stages of open-hearth furnace operation may be ascertained. Various photomicrographs of solidified melts of silica and iron oxides are described.

Analysis, Steel

Analytical Chemistry Researches Relative to Steels (Recherches de chimie analytique relatives aux aciers), A. Travers. Annales de Chimie, vol. 11, July-Aug. 1919, pp. 17-128. Experiments covered (1) manner of effecting analysis of carbon by combustion, (2) analysis of sulphur by combustion in oxygen at temperature near 1200 deg. C, (3) investigation of method of manganese analysis by means of persulfate in presence of silver nitrate and (4) application in volumetry of titanium chloride as reducing agent.

Decarburization of Steel with Hydrogen

On the Decarburisation of Steel with Hydrogen, E. D. Campbell. Iron and Steel Inst., meeting of Sept. 1919, paper no. 3, 8 pp. Experiments conducted to determine best conditions under which small bars of commercial steels might be decarburized and effect of such decarburization on electrical resistivity of annealed bars. Results are interpreted to have indicated that pure carbides of iron are less stable and more completely dissociated when in solid solution than are carbides which are formed if other elements are present.

Effervescing Steel

Effervescing Steel, Henry D. Hibbard. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, supp. to Sept. 1919, pp. 2595-2608, 6 figs. Illustrating fractures of soft plate steel ingots and steel slabs.

Fuel Economy

Report on "Fuel Economy and Consumptions in the Manufacture of Iron and Steel," William A. Bone, Robert Hadfield and Alfred Hutchinson. Iron and Steel Inst., meeting of Sept. 1919, paper no. 2, 42 pp., 1 fig. Based on inquiries made as to practice in British iron and steel works by British Assn. Fuel Economy Committee.

German Practice

Analyzes German Iron Practice. Iron Trade Rev., vol. 65, no. 17, Oct. 23, 1919, pp. 1105-1109, 3 figs. Report of commission appointed by British ministry of munitions to visit steel works in Lorraine and in that part of Saar valley occupied by French authorities.

Manganese and Carbon Steels

On the Influence of Manganese on the Physical Properties of Carbon Steel, Tokujiro Matsushita. Sci. Reports of Tohoku Imperial University, vol. 8, no. 2, Aug. 1919, pp. 79-88, 5 figs., partly on supp. plates. Specimens tested were made by alloying metallic manganese from Kahlbaum with low-carbon steel and were tested in form of rods 20 cm long and 5 mm thick. From investigations it is concluded that structure of manganese steels is very similar to that of tungsten steels.

Manganese Steel

Manganese Steel Produced in Heroult Furnaces (Ueber Manganstahl und dessen Herstellung für Stahlformguss im Heroult-Elektroofen), Berthold Schudel. Schweizerische Bauzeitung, vol. 74, no. 11, Sept. 13, 1919, pp. 129-131. Describing method of charging and phenomena observed as regards tensile strength, etc.

Metallurgical Calculations

Modern Steel Metallurgical Calculations—III, Charles H. F. Bagley. Blast Furnace & Steel Plant, vol. 7, no. 10, Oct. 1919, pp. 502-505. Average analysis per 100 tons charged in (1) acid open-hearth process with 50 per cent iron and 50 per cent scrap and (2) basic open-hearth process with 50 per cent common forge iron and 50 per cent steel scrap.

Nickel Steel

Some Experiments on Nickel Steel, N. Hudson. Iron and Steel Inst., meeting of Sept. 1919, paper no. 9, 13 pp., 1 fig. Undertaken to determine whether nickel in nickel steel would combine with carbon monoxide to form nickel carbonyl gas in a manner similar to that in Mond process for purification of nickel.

Reactions, Balanced

Balanced Reactions in Steel Manufacture, Andrew McCance. Trans. Faraday Soc., vol. 14, no. 3, July 1919, pp. 213-223 and (discussion) pp. 224-227, 1 fig. Question is studied from standpoint of physical chemistry, and connection between final quality of solid steel and antecedent conditions during manufacture is traced with special reference to contained gases. Writer deals mainly with open-hearth process.

Slag Inclusions

Slag Inclusions. Trans. Faraday Soc., vol. 14, no. 3, July 1919, pp. 188-190, 21 figs. on five supp. plates. Photomicrograph showing longitudinal and transverse sections in wrought-iron bars of various qualities. Bibliography on occluded gases is appended.

Steel Alloys

Engineering Science Before, During and After the War, Charles A. Parsons. Science, vol. 50, no. 1293, Oct. 10, 1919, pp. 333-338. Extensive use of alloys of steel is specially noted. (To be continued.) Address of President of British Assn. for Advancement of Sci.

Sulphur in Malleable Iron

Sulphur Reduced in Malleable Iron, A. W. Merrick. Foundry, vol. 47, no. 16, Oct. 1, 1919, pp. 685-687, 3 figs. Cupola metal refined in electric furnace. Sulphur is lowered by reducing slag containing calcium carbide. Advantages of duplexing process are considered.

Temperatures

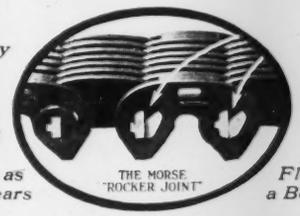
Electric, Open-hearth, and Bessemer Steel Temperatures, F. E. Bash. Bul. Am. Inst. Min. & Metallurgical Engrs., no. 153, Sept. 1919, pp. 1739-1750, 3 figs. For purpose of comparison, tapping temperatures of two 25-ton Heroult electric furnaces and one 6-ton with one 50-ton acid, one 40-ton basic, and one 65-ton acid open-hearth, all making nickel ordnance steel for guns are given.

Woody Fractures

On the Woody Structures of Fractures of Transverse Test-Pieces taken from Certain Special Steels, J. J. Cohade. Iron and Steel Inst., meeting of Sept. 1919, paper no. 4, 15 pp., 7 figs. It is concluded from experimental research work that forging finished at a high temperature improves results of transverse tests, although not to a great extent. Hence it is recommended that if very good results are sought it is preferable to diminish percentage of carbon below 5.30 per cent, if the percentage of nickel has to be increased in order to obtain necessary tensile strength after quenching.

The Drive of Efficiency *The Drive of Durability*

MORSE CHAINS



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Aeronautics

AEROPLANE PARTS

Starters

The Liberty Starter. Aerial Age, vol. 10, no. 3, Sept. 29, 1919, pp. 88 and 89, 3 figs. Design is single compact unit enclosing both hand and electric starting.

AUXILIARY SERVICE

Pumps, Fuel

Wind-Driven Petrol Pumps for Aeroplanes. Engineering, vol. 108, no. 2799, Aug. 22, 1919, pp. 239-240, 8 figs. Types constructed by Vicker's, Ltd. Air screw and pump impeller are mounted on same shaft, which is of steel, case-hardened and ground, and runs in pair of ball bearings. Impeller, which is of aluminum with radial vanes, is pinned to shaft and runs in bronze casting that forms volute chamber and also carries suction and delivery connections.

DESIGN

Performance

Prediction of Aeroplane Performance. I. M. Laddon. Flight, vol. 11, no. 41, Oct. 9, 1919, pp. 1342-1343, 1 fig. Method based in comparing performance of airplane under investigation with actual performance of similar type on a power and surface-loading basis.

Radiators

Radiator Position. R. F. Mann. Flight, vol. 11, no. 41, Oct. 9, 1919, pp. 1338-1340, 5 figs. Position as determined by necessity of varying effective area during flight and other requirements radiator must fulfil in relation to other parts of engine and operations of aviator.

Resistance

The Horsepower of Resistance in Airplane Design. N. L. Lieberman. Jl. Soc. Automotive Engrs., vol. 5, no. 3, Sept. 1919, pp. 252-261, 9 figs. Formulæ and graphs establishing conditions of fluid motion, and discussion of relation between theoretical conclusions, laboratory models and full-scale findings. (To be concluded.)

DYNAMICS

Climbing

Theory of Airplanes (Théorie des aéroplanes). M. Rateau. Aeronautique, vol. 1, no. 4, Sept. 1919, pp. 146-151, 1 fig. Formula establishing that ascensional velocity when climbing under maximum angle is inversely proportional to square root of specific weight of air. (Continuation of serial.)

ENGINES

Vibration

Airplane Engine Vibration—II. Glenn D. Angle. Aviation, vol. 7, no. 5, Oct. 1, 1919, pp. 212-216, 19 figs. Writer discusses torque reaction, variation in torque, showing torque curves for one to eighteen-cylinder engines. (Concluded.)

INSTRUMENTS

Air-Speed Indicators

Air Speed Indicators for Dirigibles. Jl. Franklin Inst., vol. 188, no. 4, Oct. 1919, pp. 535-544, 10 figs. Description of two forms of air speed indicator developed by Aeronautics Staff of U. S. N., both based on double-throat venturi, but made waterproof by shielding smaller inner venturi from direct impact of drops or spray.

METEOROLOGY

Cyclones

The Travelling Cyclone. Lord Rayleigh. Lond., Edinburgh, and Dublin Phil. Mag., vol. 38, no. 225, Sept. 1919, pp. 420-424, 1 fig. General problem is studied analytically in two dimensions, starting from usual Eulerian equations.

Electrical Phenomena

Electrical Phenomena in the Upper Atmosphere—I. S. Chapman. Sci. Am. Supp., vol. 88, no. 2282, Sept. 27, 1919, pp. 198-199 and p. 202. Electrical phenomena occurring in stratosphere and above levels of instrumental observation. (To be continued.) From Instn. Elec. Engrs., London.

Meteorological Information

The Supply of Meteorological Information. H. G. Lyons. Aeronautical Jl., vol. 23, no. 103, July, 1919, pp. 397-406, 1 fig. In order to efficiently and economically issue forecasts and weather maps, wide and prompt cooperation, careful coördination of effort and ready sharing of all information are said to be necessary.

PLANES

Cato

The Cato Sporting Monoplane. Flight, vol. 11, no. 41, Oct. 9, 1919, pp. 1334-1336, 5 figs. Sporting machine. General specifications are: Overall span, 28 ft. 11½ in.; overall length 20 ft. 10 in.; weight fully loaded, 727 lb., climb in 10 min. 4500 ft.; ceiling 1200 ft.

Hospital Aeroplanes

Hospital Airplanes (Avions sanitaires). Aéronautique, vol. 1, no. 4, Sept. 1919, pp. 129-132, 10 figs. Special design of fuselage to carry wounded, and provided with radio-surgical apparatus and medical supplies.

Oertz

The Oertz Flying Boats. Flight, vol. 11, no. 41, Oct. 9, 1919, pp. 1345-1349, 10 figs. Made in two types, biplane and tandem biplane; both are fitted with Maybach engines of from 150 to 240 hp. in single biplane and two 240 hp. in tandem.

Westland

The Westland Limousine Aeroplane. Engineer, vol. 128, no. 3325, Sept. 19, 1919, pp. 271-272 and 280, 21 figs., partly on supp. plates. Fuselage is much broader and deeper than usual. Machine is capable of carrying 3 passengers and pilot or 500 to 600 lb. of mail.

PROPELLERS

Variable-Pitch Propellers

Variable Pitch Propellers (Verstellbare Luftschrauben). C. Eberhardt. Motorwagen, vol. 22, no. 18, June 30, 1919, pp. 309-313, 4 figs. Since opinions as to necessity of variable pitch propellers differ, writer attempts to clarify this question by calculating first of all tractive power of propeller necessary for horizontal flight of a given machine at various heights and to present it graphically, basing his calculations on Kann's theory of ascension. (To be continued.)

TESTING

Altitude Laboratory

Altitude Laboratory for the Testing of Aero Engines. H. C. Dickinson and H. G. Boutell. Flight, vol. 11, no. 42, Oct. 16, 1919, pp. 1378-1380, 4 figs. Aerial Age, vol. 10, no. 3, Sept. 29, 1919, pp. 85-87 and 97, 7 figs. For measuring horsepower and brake mean effective pressure at full throttle for various conditions, mechanical losses, heat distribution, exhaust gas analysis, oil consumption and distribution, carburetor performances and low air pressures and temperatures as affecting performances of engines and accessories.

Marine Engineering

SHIPS

Deadweight Carrier

What Constitutes a Good Deadweight Carrier? Shipbuilding & Shipping Rec., Sept. 25, 1919, pp. 7-9. Factors affecting selection of size, form, type and structure, derrick arrangement, and propelling machinery.

Diesel-Engine Drive

Trawler Has Gas-Electric Drive. Herbert R. Simonds. Mar. Rev., vol. 49, no. 11, Nov. 1919, pp. 503-505, 5 figs. Two 8-cylinder Diesel engines are direct-connected to generators which energize motor driving propeller shaft.

Drive for Wooden Ships

Diesel Engine, Electric Drive planned for Wooden Ships. Mar. News, vol. 6, no. 6, Nov. 1919, pp. 158-159, 5 figs. Plan of Winton Engine Works, Cleveland, Ohio, consists of removing from wooden steamers of U. S. Shipping Board reciprocating engines and other equipment now in them, replacing these with Diesel engines operating electric generators.

Geared Turbines

Geared Turbine Propelling Machinery of H. M. S. "Raleigh." Engineering, vol. 108, no. 2802, Sept. 12, 1919, pp. 340-341 and 344, 6 figs. Machinery is of Brown-Curtis type, having four shafts, each of which is driven by a high-pressure and low-pressure turbine through single-reduction gearing.

Propellers

Propeller Data from U. S. S. New Mexico's Trials. S. M. Robinson. Jl. Am. Soc. Naval Engrs., vol. 31, no. 3, Aug. 1919, pp. 598-614, 9 figs. Two sets of trials were held—one when ship had been out of dock about seven weeks and one just after she had been docked. A difference between two trials of about 4250 shaft horsepower at 21 knots was obtained due to foul condition of ship's bottom. From this and similar experiences with other ships it is noted that fouling occurs very rapidly in first few weeks that a ship is out of dry dock.

Propulsion

The Passing of the Direct-Connected Turbine for the Propulsion of Ships. C. W. Dyson. Jl. Am. Soc. Naval Engrs., vol. 31, no. 3, Aug. 1919, pp. 555-576, 4 figs. Tables and graphs showing comparative steam economy of turbines and reciprocating engines in warships of various types. Difference is decidedly in favor of Parsons installations except where geared cruising element is used, in which case Curtis installation with medium-speed propeller is seen to be slightly superior from 10½ knots down.

See also Geared Turbines, Diesel-Engine Drive, Drive for Wooden Ships.

YARDS

Burntisland Company Yard

The New Shipyard of the Burntisland Shipbuilding Company, Limited. Shipbuilding & Shipping Rec., Sept. 25, 1919, pp. 12-16, 6 figs., partly on supp. plates. Notes on yard equipment and machinery; also details of 300-ft., 6000-ton vessels being built for French Wine Trade.

Shipways

New Shipways at Newport News Departure from Ordinary Practice. A. F. Mattson. Eng. & Contracting, vol. 52, no. 17, Oct. 22, 1919, pp. 462-463, 1 fig. Chief departure from ordinary is location of lower portion of incline plane partly below mean water level, this portion to be pumped out and kept free from water during entire time of construction of ship.

Welding

Electric Welding in Steel Ship Building. George R. Cooley. Pac. Mar. Rev., vol. 16, no. 10, Oct. 1919, pp. 102-103, 5 figs. Illustrating process of welding angle iron corners.

Railroad Engineering

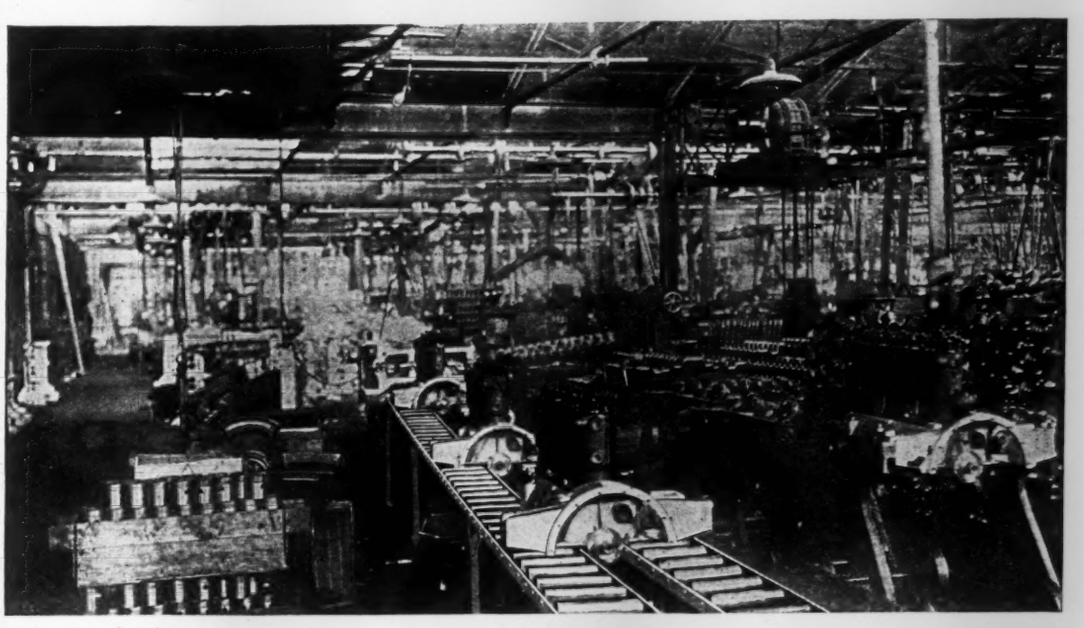
ELECTRIC RAILROADS

Armature Leads Breakage

Preventing the Breakage of Armature Leads on Railway Motors. A. L. Broomall. Elec. Jl., vol. 16, no. 10, Oct. 1919, pp. 440-443, 1 fig. Methods for overcoming trouble by (1) reducing vibration, or (2) increasing resistance of armature leads so that these can resist vibration, are classified and discussed.

Emergency Car

Emergency Car for Electric Railways (Störungswagen für elektrische Bahnen). H. Uhlig. Elektrische Kraftbetriebe u. Bahnen, vol. 17, no. 14, May 14, 1919, pp. 105-106, 1 fig. Principal requirements of such a car said to be: Independence from tracks; radius of at least 100 km.; and must be equipped for handling derailment, collisions, overhead line trouble, as well as for caring of wounded. Such a design is described.



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Freight Haulage

Electric Railway Freight Haulage, A. B. Cole. Elec. Jl., vol. 16, no. 10, Oct. 1919, pp. 453-456, 6 figs. Economical value discussed and organization suggested.

Operation

Electric Railway Passenger and Freight Transportation, C. E. Morgan. Elec. Jl., vol. 16, no. 10, Oct. 1919, pp. 422-426, 4 figs. Observes that electric railways are not generally operated to fullest capacity inasmuch as they do not operate either freight or passenger service between midnight and 5 A.M. and urges managers to develop their freight business to such a point that there will be no portion of the 24 hours of the day during which railways are not productive.

ELECTRIFICATION

Spain

Electrification of Spanish Railways (Electrificacion de los ferrocarriles espanoles), D. Luis Sanchez Cuervo. Revista de Obras Publicas, vol. 67, nos. 2294, 2295 and 2296, Sept. 11, 18 and 25, 1919, pp. 449-453, 464-469 and 275-480. Sept. 11: Technical aspect of problem. Sept. 18: Question of whether electrically operated systems are dependable to give steady service; comparison in this respect with steam roads. Sept. 25: Traffic in Spanish railways is considered as too reduced to permit their economical electrification.

EQUIPMENT

Inspection

The Inspection and Construction of Modern Carriage and Wagon Stock. Ry. Engr., vol. 40, no. 477, Oct. 1919, pp. 220-224; 3 figs. English practice of inspection and specifications of steel-rolled sections and plates used for underframe members of rolling stock. (To be continued.)

Standardization of Equipment

Standardization of Railway Equipment. Ry. Rev., vol. 65, no. 15, Oct. 11, 1919, pp. 534-536. Views of railway supply trade as expressed to Congress.

Standardization of Painting

Standardized Painting of Railroad Equipment, W. A. Buchanan. Ry. Rev., vol. 65, no. 14, Oct. 4, 1919, pp. 491-493. Outline of plan of painting of equipment as practiced on Delaware, Lackawanna & Western Railway. Suggestions in regard to stenciling of equipment are included.

LOCOMOTIVES

Dutch Express Locomotives

New Dutch Express Locomotives (De snelreinlocomotieven Serie 71/78 der Nederl. Centraal Spoorweg-Maatschappij), J. H. Gehlen. Ingenieur, vol. 34, no. 31, Aug. 2, 1919, pp. 565-570, 9 figs. Eight engines of following characteristics were supplied before war by German firm to Dutch Central Ry.: Four 15¾ in. by 25¼ in. cylinders; tractive force 20,300 lb.; total weight 70 tons; working steam pressure 174 lb.

OPERATION AND MANAGEMENT

Train Resistance

Passenger Train Resistance, Edward C. Schmidt and Harold H. Dunn. Univ. of Illinois Bull., vol. 16, no. 15, Dec. 9, 1918, 44 pp., 11 figs. Results of experiments made with passenger trains throughout their ordinary range of speed.

Vibration

Apparatus for the Registration of Oscillations of Railway Material to judge Cars and Track (Toestellen voor het aanteekenen van slingeringen van spoorwegmaterieel en het gebruik voor de beoordeeling der voertuigen en van het spoor), E. Bolleman Kijlstra. Ingenieur, vol. 34, no. 37, Sept. 13, 1919, pp. 672-681 and (discussion) pp. 681-682, 31 figs. Description of Rossignol, Sabouret, van Schlick and other designs.

RAILS

Standard Open-Hearth and Bessemer-Steel Rails. Assn. Am. Steel Manufacturers pamphlet, July 7, 1915, 16 pp. Standard specifications.

SHOPS

Automatic Tools

Automatics in Railroad Shops, M. H. Williams. Mech. World, vol. 66, no. 1711, Oct. 17, 1919, pp. 183-184, 5 figs. Automatic machines are divided into three classes: Single-spindle machines in which one bar is worked on at a time; multiple-spindle machine on which four or more bars are worked on at one time; and automatic chucking machine used for machining castings and forgings. Machines of these types are illustrated. (To be continued.)

Baltimore and Ohio Shops

Baltimore & Ohio Shops, Cumberland, Md. Ry. Rev., vol. 65, no. 16, Oct. 18, 1919, pp. 557-559, 4 figs. For handling heavy locomotive repairs. Special feature is grain equipment which makes it possible to handle by power all work passing into and through shops.

Blacksmith Shop

The Up-to-Date Railroad Blacksmith Shop, George Fraser. Ry. Rev., vol. 65, no. 14, Oct. 4, 1919, pp. 490-491. Outlines essential features of modern railway blacksmith shop including specially those required by structure in which department is housed as well as those pertaining to modern furnaces and forging machines and their arrangement.

Flue Replacement

Flues—III, IV and V, George L. Price. Boiler Maker, vol. 19, nos. 6, 7 and 8, July and Aug. 1919, pp. 154-156, 199-201 and 242-245, 4 figs. Method of removing and replacing set of flues in locomotive boiler; work done in roundhouse. Precautions observed in expanding flues; method of removing scale; applying arch tubes; welding superheater tubes.

STREET RAILWAYS

Controls

Automatic HL Control for Boston Surface Cars, A. D. Webster. Elec. Jl., vol. 16, no. 10, Oct. 1919, pp. 459-464, 10 figs. Installation provides for multiple unit operation for side cars where private right-of-way is employed in more congested districts.

Gasoline-Motor Traction

Gasoline vs. Electric Motors, N. W. Storer. Aera, vol. 8, no. 3, Oct. 1919, pp. 375-378. Elec. Ry. Jl., vol. 54, no. 15, Oct. 11, 1919, pp. 27-29. Oct.: Study of their respective merits for steet railway service. Oct. 11: Writer believes present gasoline motors cannot compete with electric motor as railway motive power because of greater depreciation of gasoline equipment than that of electric equipment and because electric motors excel in low-maintenance cost. Paper read before Am. Elec. Ry. Assn.

Locomotives

Comparison of Low-Speed and High-Speed Interurban Freight Locomotives, D. C. Hershberger. Elec. Jl., vol. 16, no. 10, Oct. 1919, pp. 436-440, 5 figs. It is concluded that adequate energy supply and service to be performed are factors which influence locomotive of proper speed characteristics and hauling capacity.

Management

Transportation and Traffic Problems, Luke C. Bradley. Stone & Webster Jl., vol. 25, no. 4, Oct. 1919, pp. 275-282. Concerning various details of management.

Municipal Operation

Municipal Railway Operation at Seattle, Washington, Thomas F. Murphine. Elec. Jl., vol. 16, no. 10, Oct. 1919, pp. 428-430. Résumé of operating receipts for the first quarter of 1919 during which time the city has operated its railway system, fare being kept at 5 cents.

One-Man Cars

Are High Costs of Service Likely to Develop Permanent Competition? L. H. Palmer. Elec. Ry. Jl., vol. 54, no. 15, Oct. 11, 1919, pp. 11-13. Suggests use of one-man cars and adoption of zone system of fare collection. Paper read before Am. Ry. Assn.

Safety Car

The Safety Car, N. H. Callard, Jr. Elec. Jl., vol. 16, no. 10, Oct. 1919, pp. 447-452, 6 figs. Figures and experiences of various cities quoted in proof of assertion that "safety car" permits increased service without increasing cost of operation.

Service with the Safety Type Car, E. A. Palmer. Elec. Jl., vol. 16, no. 10, Oct. 1919, pp. 426-428, 1 fig. Advantages of safety car specially noted are said to be: (1) reduction of accidents, (2) faster schedule speed and increased service with same number of cars, (3) satisfaction of city government and operators, and (4) reduction in rolling equipment maintenance.

Safety Car Scores a Success in Kansas City, P. J. Kealy. Elec. Ry. Jl., vol. 54, no. 15, Oct. 11, 1919, pp. 31-36. Testimonials of operating men, manufacturers and consulting engineers on what frequent service car has accomplished and may be expected of it in reducing cost and increasing revenues. Abstracts of papers presented before meeting of Transportation and Traffic Assn.

TERMINALS

Freight Terminal

Minor Buildings of a Large Freight Terminal. Ry. Rev., vol. 65, no. 14, Oct. 4, 1919, pp. 481-483, 5 figs. Plans and illustrations of frame structures adopted to office purposes and convenience and public welfare of employees engaged in operating yards.

Locomotive Handling

Caring for Locomotives at Terminals. Ry. Rev., vol. 65, no. 14, Oct. 4, 1919, pp. 483-490, 18 figs. Committee report read at Convention of Travelling Engineers' Assn.

General Science

CHEMISTRY

Adsorption

Studies of the Adsorption of Gases by Charcoal—1, Harvey Brace Lemon. Phys. Rev., vol. 14, no. 4, Oct. 1919, pp. 281-292, 8 figs. Variations due to heat treatment examined for case in which mass of air used was less than that required to saturate charcoal.

Analysis

An Improved method for Determination of Carbon by Wet Combustion, Using Barium Hydroxide as Absorbent, P. L. Hibbard. Jl. Indus. & Eng. Chem., vol. 11, no. 10, Oct. 1, 1919, pp. 941-943. Substance is heated in Kjeldahl flask with chromic anhydride and sulfuric acid whereby carbon is oxidized to carbon dioxide which is carried into solution of barium hydroxide by current of purified air; after reaction is completed excess of barium hydroxide is determined by titration with standard hydrochloric acid.

Catalysis

A Study of Catalytic Actions at Solid Surfaces—I, Hydrogenation of unsaturated Fats in the Liquid State in Presence of Nickel, E. F. Armstrong and T. P. Hilditch. Proc. Roy. Soc., vol. 96, no. A-675, Sept. 4, 1919, pp. 137-146, 2 figs. Comparison of behavior of unsaturated fatty oils towards hydrogen in presence of finely disseminated nickel, with that of glucosides, towards water in presence of enzymes.

PHYSICS

Acoustics

Engineering Science Before, During and After the War—II, Charles A. Parsons. Science, vol. 50, no. 1294, Oct. 17, 1919, pp. 355-362. Account of development of sound-range and listening devices. (To be concluded.)

Propagation of Sound in an Irregular Atmosphere, G. W. Stewart. Phys. Rev., vol. 14, no. 4, Oct. 1919, pp. 376-378. Under poor atmospheric conditions lower frequencies in aeroplane engine sounds become relatively enhanced; under good conditions frequencies of order of 1000 d. v. are heard at greatest distances.

Electricity

Several Problems Relative to Polymorphous Transformation. (Sur quelques problèmes relatifs aux transformations polymorphiques.) F. Guéry. Revue Générale de l'Electricité, vol. 6, no. 10, Sept. 6, 1919, pp. 291-297, 9 figs. Technical discussion of possibilities (1) to transform alternating current into direct current or vice versa by electromagnetic induction, (2) to construct a synchronous motor without commutator, and (3) to transform current of given frequency into one of any other frequency and the frequency of which may be varied without a commutator.

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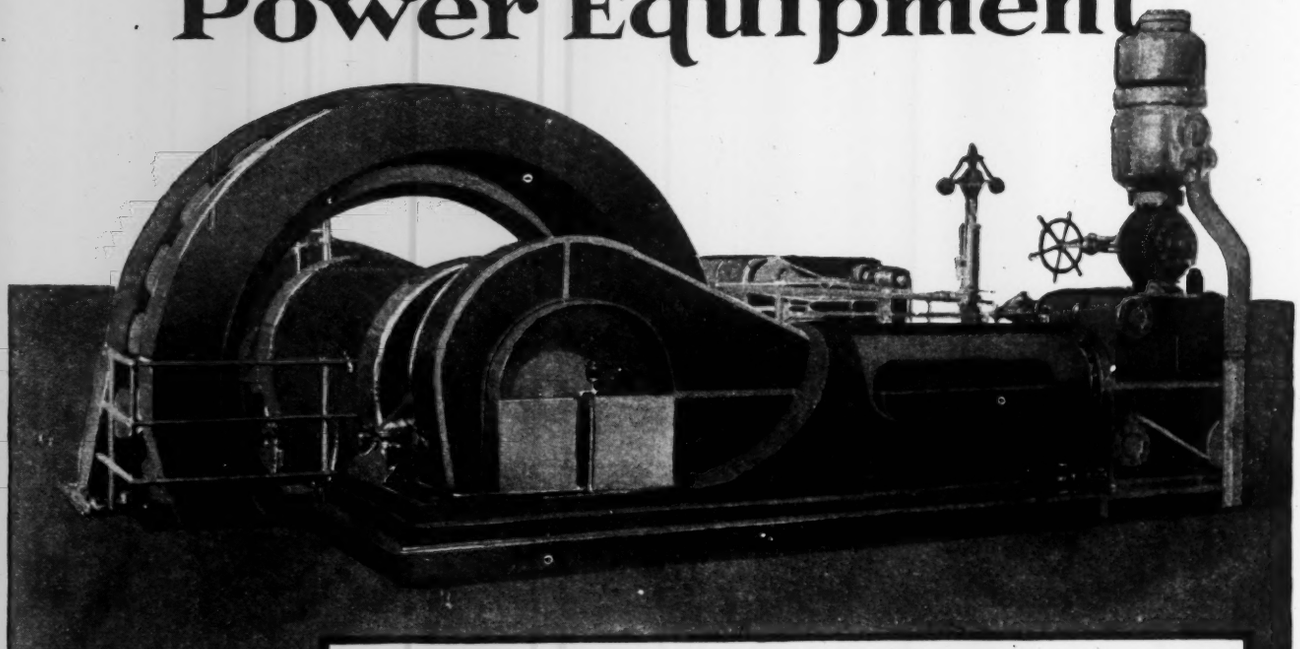

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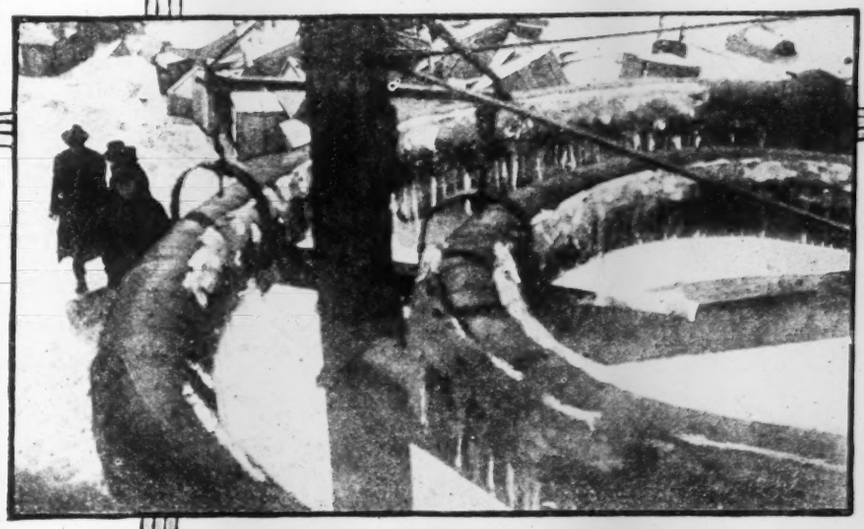

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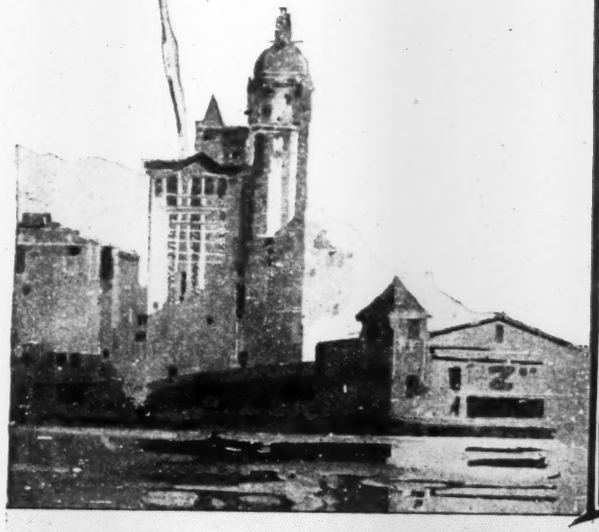

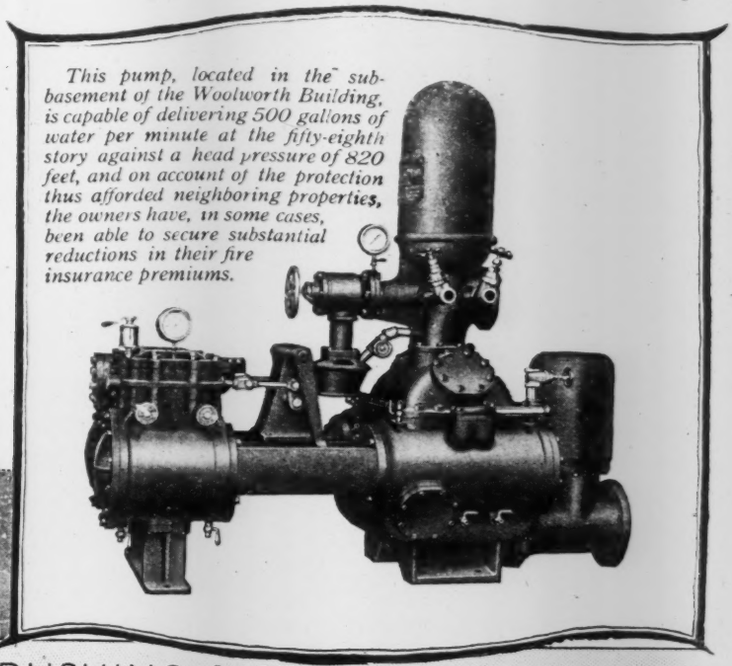

This pump, located in the sub-basement of the Woolworth Building, is capable of delivering 500 gallons of water per minute at the fifty-eighth story against a head pressure of 820 feet, and on account of the protection thus afforded neighboring properties, the owners have, in some cases, been able to secure substantial reductions in their fire insurance premiums.

-METERS-MINING-ROCK CRUSHING & CEMENT MACHINERY

WORTHINGTON

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Buffalo, N. Y.
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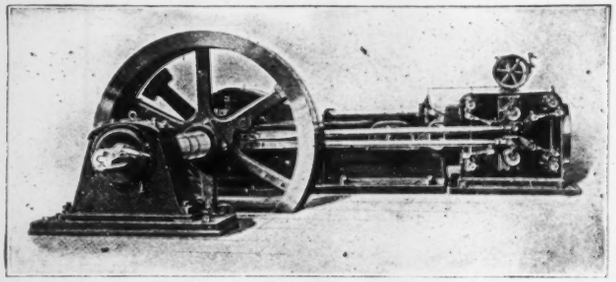
Gas Engine Works
Cudahy, Wis.

Chuse ENGINES

Chuse Engines are designed and built for ECONOMY - SIMPLICITY - DURABILITY

High-Grade Steam Engines
Poppet Valve Uniflow type
(Stumpf Patents)
Non-Releasing Corliss types

They are easy to maintain and operate—their simplicity of construction means less trouble.



Chuse Engine and Manufacturing Co.
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NEW ORLEANS
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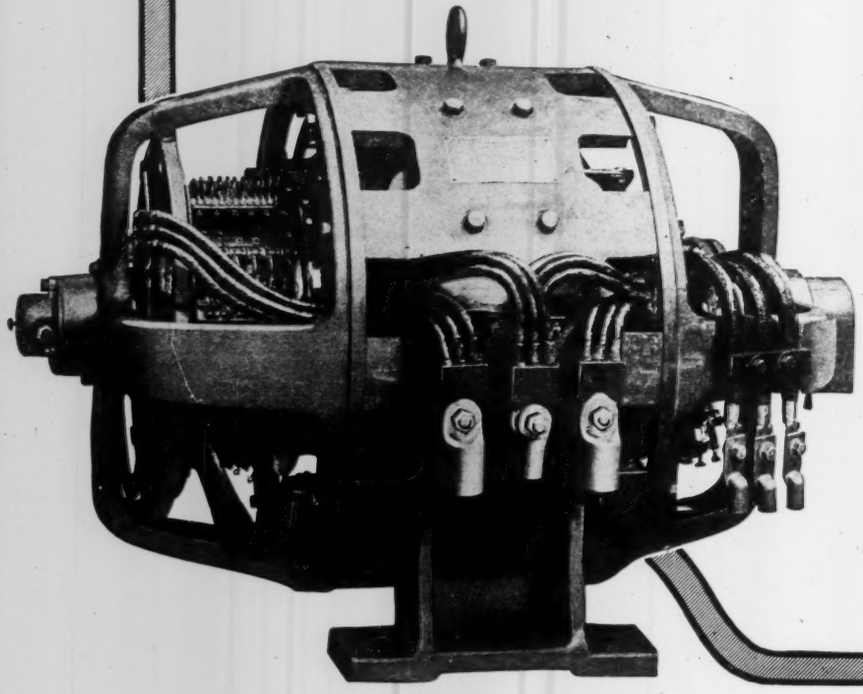
Allis-Chalmers



Bracket Bearing Type Rotary Converters

Ratings of 100 KW., 150 KW. and 200 KW. are built in this type for industrial and mining service.

Allis-Chalmers Mfg. Co.
Milwaukee, Wisconsin
District Offices in all leading cities

Sturtevant Quality
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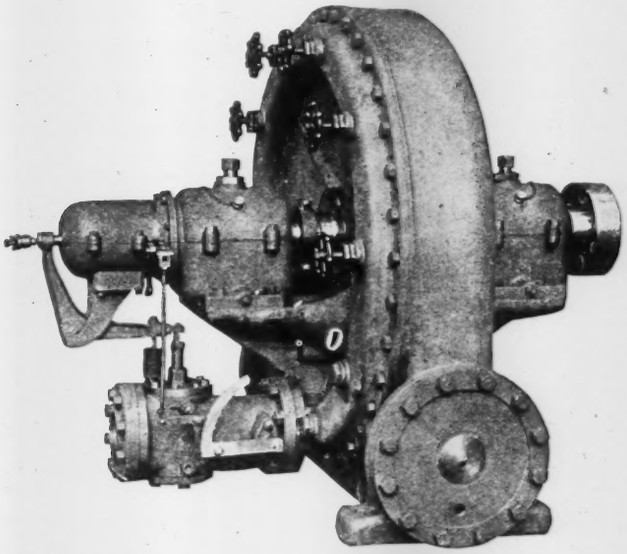
Steam Turbines

For Dependability — For Economy



The Product of 12 Years' Development and Refinement

THE supreme quality and rugged construction of the improved, Type 6 Turbines is typically Sturtevant. They work well because they are made well. Particularly adapted to driving Sturtevant Fans, Blowers, Generators, and Pumps and other auxiliaries, with the minimum in steam consumption, attention, and repairs. Built with solid rotors, having buckets milled into the rim by our own patented process.

Rotor

Have individually controlled nozzles with integral reverse buckets to insure the most efficient absorption of the steam velocity. Unsurpassed in close speed regulation and in protection against overspeed. Our new three-part catalog covers in detail the construction, parts, care, operation, uses, and merits of Sturtevant Turbines. *We'd like to send yours. Where?*

B. F. STURTEVANT COMPANY
HYDE PARK, BOSTON, MASS., AND ALL PRINCIPAL CITIES

Turbo-Generators | Sturtevant PUTS AIR TO WORK | ***Reduction Transmissions***

We Equip Big Plants

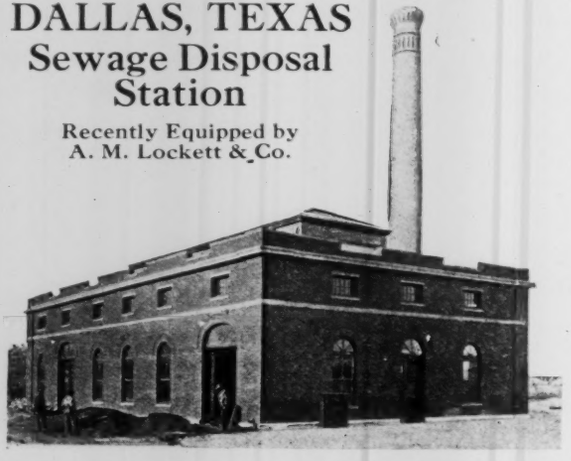
We design, construct and equip complete power plants; and manufacture complete oil-burning equipment.

We have just furnished and erected complete mechanical equipment for the main sewage disposal station of Dallas, Texas: boilers, pumps, engines and auxiliaries.

A. M. Lockett & Co., Ltd.

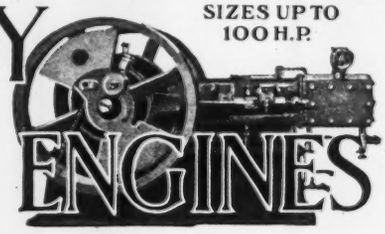
Contracting Mechanical Engineers
NEW ORLEANS
Houston, Tex. Fort Worth, Tex. Atlanta, Ga.

DALLAS, TEXAS
Sewage Disposal Station
Recently Equipped by A. M. Lockett & Co.



TROY ENGINES

SIZES UP TO 100 H.P.

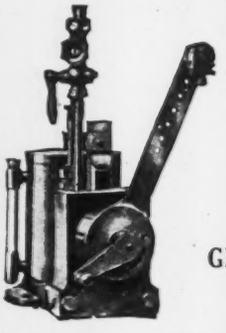


ONLY STEAM ENGINES
Good Engines only

Troy Engines give satisfactory service.
They are economical and durable because their self-oiling feature saves oil and insures thorough and reliable lubrication.
They have other good features — our catalog tells all about them — send for it today.

TROY ENGINE COMPANY
TROY, PA.

ROCHESTER
Automatic Lubricators



For use on all types of steam engines and pumps and air and ammonia compressors.

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GREENE, TWEED & CO.
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SPECIALIZED CONSULTING SERVICE

in ALL BRANCHES of the ENGINEERING FIELD

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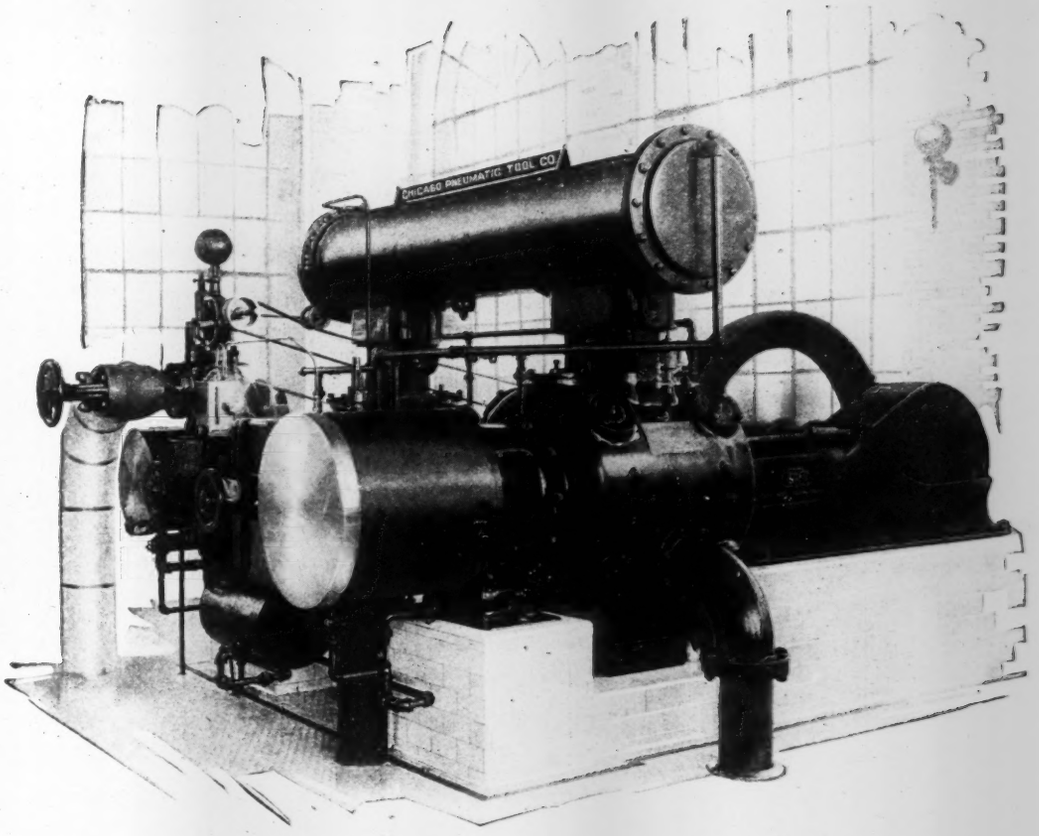
Power Plants	Refrigeration	Time Study	Machine Design
Plant Construction	Centrifugal Pumps	Inspection	Special Machinery
Power Transmission	Heating and Ventilating	Testing	Textile Machinery
Steam Turbines	Air Conditioning	Appraising	Tool Designing
Combustion	Industrial Processes	Management	Invention Development
Water Purification	Production	Cost Systems	Patent Law



Two Years in Constant Operation —and still "Brand New!"

"You couldn't tell it from a brand new compressor," Mr. B. S. Platt, Chief Engineer for the Burrough's Adding Machine Company, says of their Class O-CSC "Chicago Pneumatic" Air Compressor, pictured above. *Staying power* is decidedly characteristic of "Chicago Pneumatic" Air Compressors, in any of their 300 distinct sizes and types.

Throughout their long service life, "Chicago Pneumatics" insure economies of operation which result in a substantial reduction of the monthly power bill. Automatic regulation—which varies the power consumption to correspond with variable load conditions—is a chief economy factor in *all* "Chicago Pneumatic" Compressors.

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Depend upon that Name

THREE-CYLINDER

NASH GAS ENGINE

ARRANGED FOR BELT DRIVE

Made in sizes as follows:

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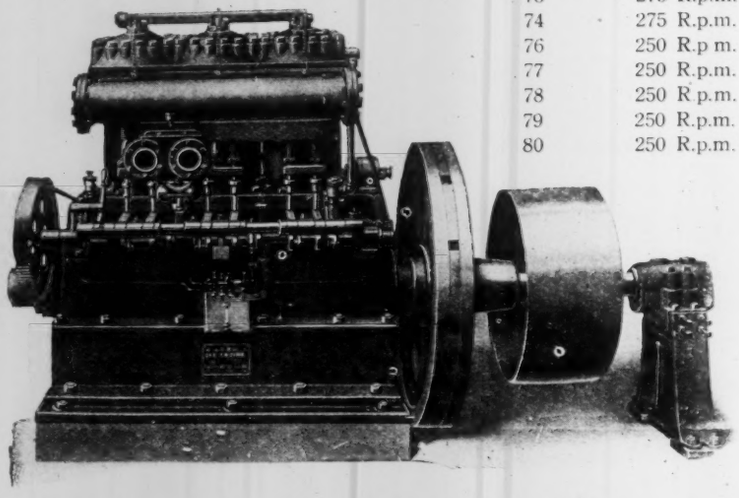
73	275 R.p.m.	50	35
74	275 R.p.m.	65	45
76	250 R.p m.	85	65
77	250 R.p.m.	100	75
78	250 R.p.m.	125	90
79	250 R.p.m.	150	110
80	250 R.p.m.	185	140



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Established 1870

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Efficient Dependable Power

In efficiency and dependability the "Western" Diesel Engine is far in advance of what heretofore has been considered possible by any but extremely high priced engines of most complicated design and construction.

This high efficiency and absolute dependability, together with the extraordinary simplicity and low cost of the "Western" make it the foremost power equipment available today for every power purpose.

Built in single and multiple cylinder units of 25 B. H. P. per working cylinder

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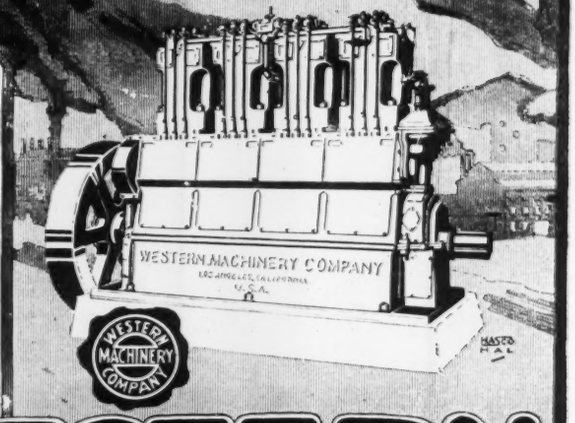

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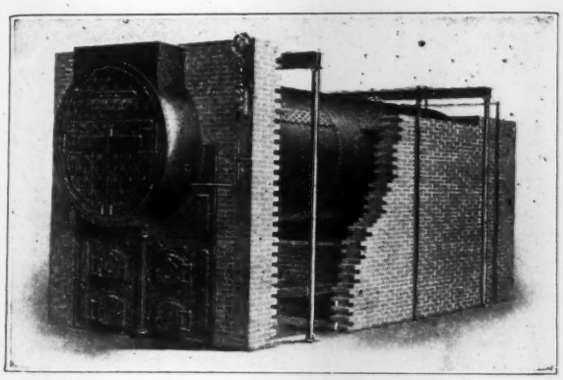


Schofield's Horizontal Tubular Boiler

J. S. SCHOFIELD'S SONS CO.

MACON, GEORGIA

Established 1855 *Incorporated 1900*

Manufacturers of

HORIZONTAL AND VERTICAL TUBULAR BOILERS, AUTOMATIC AND THROTTLING SLIDE VALVE ENGINES, STEEL TANKS AND TOWERS AND STANDPIPES

for Sprinkler Systems and Municipal Supply.

ALL KINDS OF SPECIAL CASTINGS, SHEET, PLATE AND STRUCTURAL STEEL WORK.

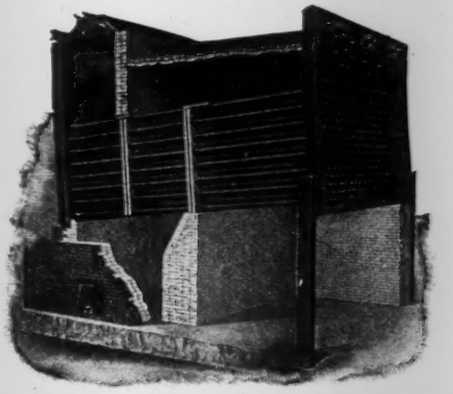
Schofield Boilers

are built to meet the specifications of the A. S. M. E. Boiler Code, which insures safety

The Special Features Assuring

Economy, Efficiency and Durability

are to be found in



EDGE MOOR WATER TUBE BOILERS

These cannot be explained in the limited space of an advertisement. Those interested in steam boilers and in tests of unusual performances should send for our illustrated bulletins. The details of design and construction which assure a minimum of heat losses, low fuel cost, and general all round reliability and satisfactory service are fully given. The Edge Moor boilers

Meet the Exacting Conditions of Modern Power Plants and are Especially Suitable for those of Large Size

Our Literature Will Show Why; Send for It

Edge Moor Iron Company

Edge Moor, Delaware

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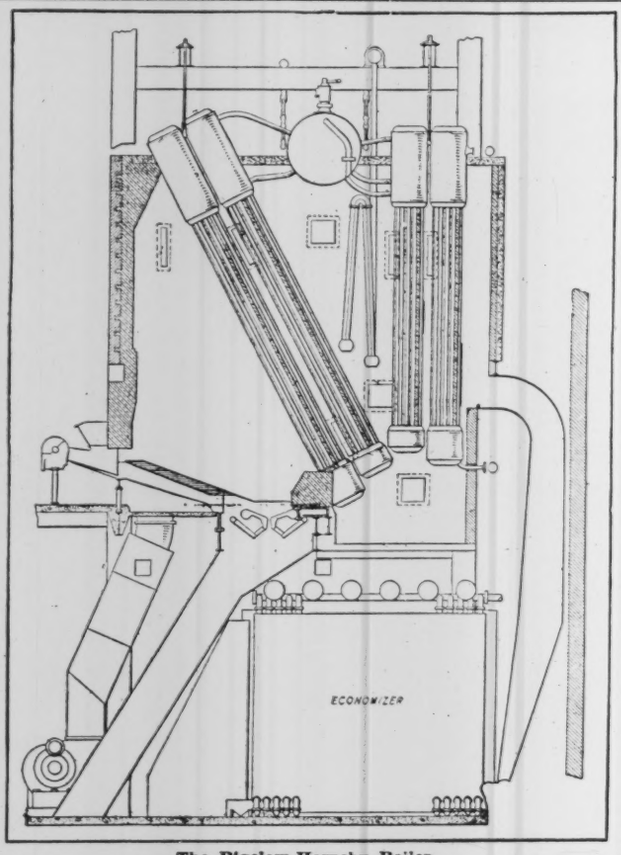

The Bigelow-Hornsby Boiler

BIGELOW BOILERS

Whether your plant calls for stoker-fired units up to 3000-horsepower capacity or for a small hand-fired boiler, the highest safety and economy will be maintained by Bigelow Boilers.

The Bigelow-Hornsby Boiler

Contains a greater amount of direct heating surface than embodied in other designs.

The steam liberating surface is 100 per cent. of the tube area.

Countercurrent unrestricted circulation through straight tubes.

Easy to clean. Readily accessible both internally and externally. No handholes or tube caps to remove and replace.

The free suspension from overhead steel work eliminates expansion and contraction stresses.

THE BIGELOW COMPANY

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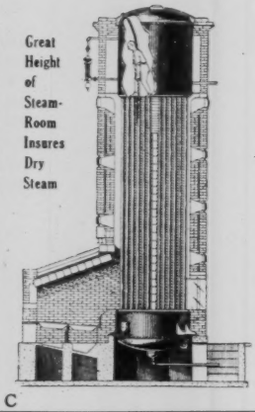

C

Wickes Vertical Water Tube Boiler

Ask us why engines are never wrecked and steam turbines never have eroded and clogged blades and nozzles when using this boiler?

Ask for— Aids in the selection of a boiler —sent free

THE WICKES BOILER CO.

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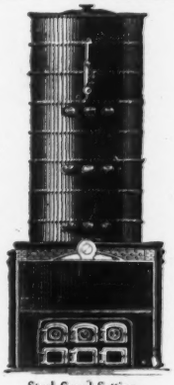


Steel Cased Setting Increases Efficiency

UNION WATER TUBE BOILERS

Built in Various Sizes for all Practical Pressures

True Boiler Economy embraces three vital essentials:

Continuous efficient operation
Maintenance expense
Original cost of installation

The UNION WATER TUBE BOILER

has more practical features tending toward the first essential than any other Water Tube Boiler made today. The maintenance is unusually low, due to proper provision to take care of distortion, and elimination of double thickness of plates or rivets in fire. The first cost of installation *is* consistent with quality and efficiency, and low where these features are considered.

It will pay you to get in touch with our office in your district or to send for our catalog.

UNION IRON WORKS . . ERIE, PA.

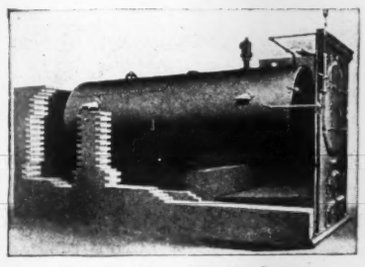
Erie City Boilers

Erie City Boilers are Safe—

Every Erie City Boiler is built to meet the specifications of the A. S. M. E. Boiler Code and is therefore safe. The A. S. M. E. Boiler Code is recognized as the standard—it is the collective knowledge and experience of experts—its wide adoption has eliminated unnecessary risk and protects human life and property.

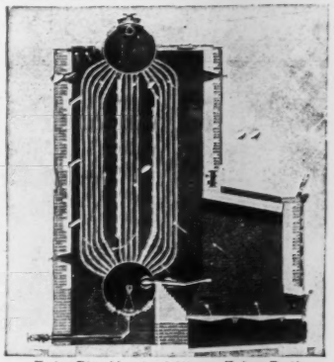
Before you install that new unit—get the facts and figures on Erie City Boilers

All types All sizes

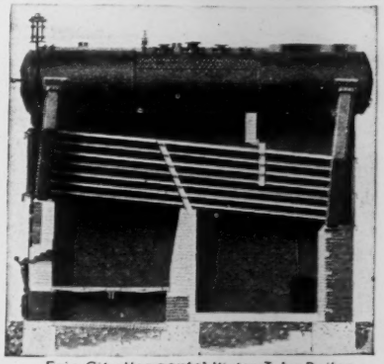


Erie City Return Tubular Boiler

Erie City "Economic" Boiler



Erie City Vertical Water Tube Boiler



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ERIE CITY IRON WORKS – *Erie, Pa.*

Manufacturers of Steam Engines, Boilers and Feed Water Heaters, Horizontal and Vertical Water Tube Boilers and Lentz Engines.

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

WATER TUBE STEAM BOILERS

STEAM SUPERHEATERS MECHANICAL STOKERS

Works: BARBERTON, OHIO BAYONNE, N. J.

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KEELER
CROSS DRUM BOILER

will be sent on request, as well as our catalogs of

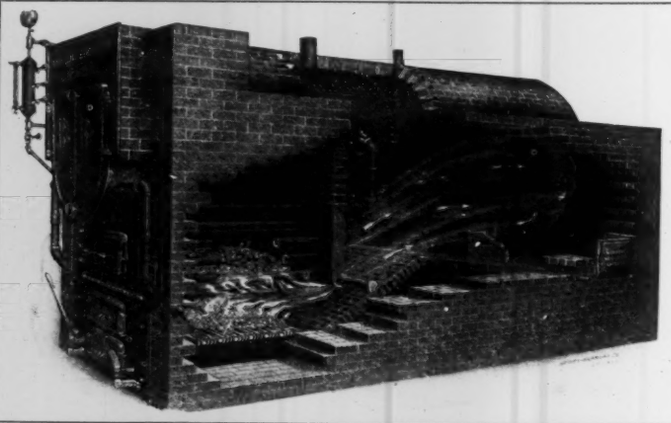
WATER TUBE AND RETURN TUBULAR TYPES

Address:

E. KEELER COMPANY, Williamsport, Pa.

ESTABLISHED 1864

Branches: New York, Philadelphia, Boston, Pittsburgh



Herbert Smokeless Boilers

Down Draft **Detachable Firebox**

An absolutely smokeless boiler that is guaranteed to consume 95% of smoke from any grade of mine coal and to increase the boiler capacity from 5 to 25 h.p., depending on size.

HERBERT BOILER CO., Chicago

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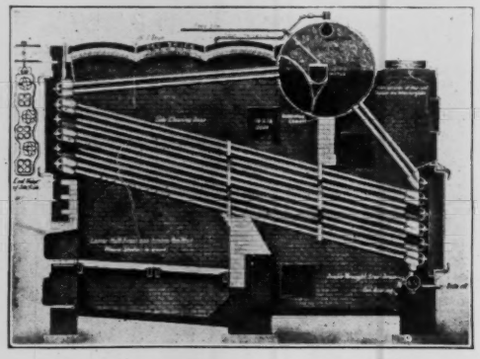

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Springfield Water Tube Boiler

Sectional-Sinuous Headers **All Steel Construction**

No Staybolts **No Braces** **No Bent Tubes**

Each section suspended independent of all other sections.

Hand holes have inside plates of drop forged steel, each covering *four* tubes.

65% less hand holes than other horizontal W. T. boilers.

Occupy less space and require less brick than other horizontal W. T. boilers.

Baffles are indestructible and permit removal of any tube without disturbing other tubes or baffles.

And many other *special* features.

Springfield Boiler Company
Springfield, Illinois

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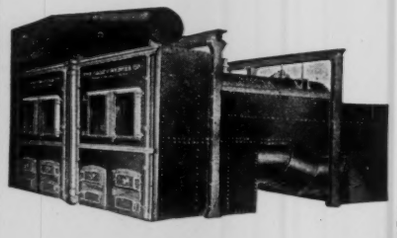
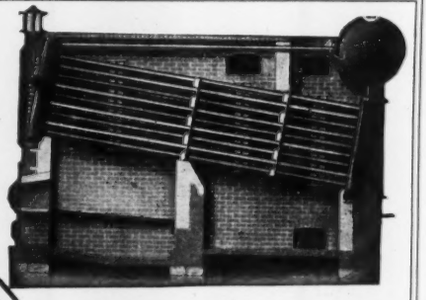
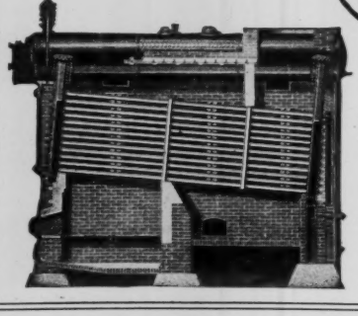


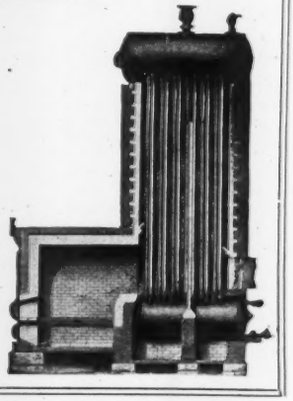


A S E M

S S

.CODE. BOILERS





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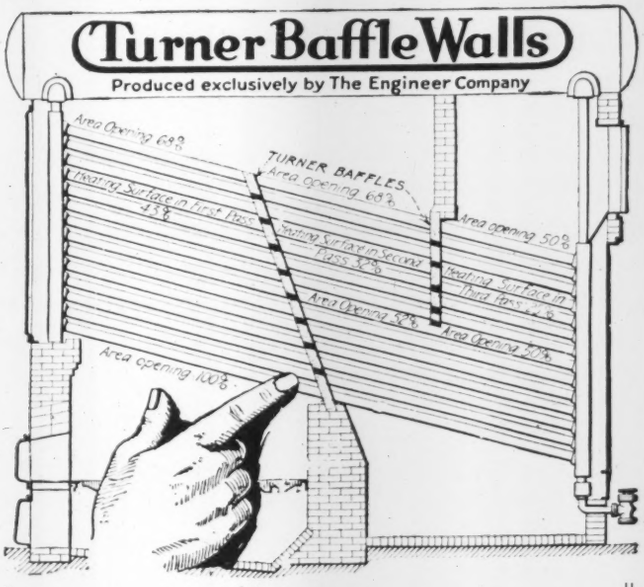
The Casey-Hedges Co.
Chattanooga, Tenn.
CHICAGO NEW YORK HABANA

Turner Baffle Walls

Produced exclusively by The Engineer Company



The Solution of that Slag Formation Problem

SLAG is a heat thief. You know from experience how it sticks to the lower tubes of your boilers, causing a restriction in the passages for the heated gases at the bottom of the first pass.

TURNER Baffle Walls, because they can be installed at any angle, enable the entrance area to the first pass to be increased, thus decreasing the velocity of the gases and reducing the amount of flying ash or slag sucked up on to the boiler tubes.

THIS tapered pass, which Turner Baffle Walls have made practicable, has long been known by engineers to be theoretically correct. The only drawback to actual construction—the difficulty of keeping the material in such walls in place—has been entirely solved in the Turner Baffle Wall by means of the combination of keyed tiles and plastic material between the tiles.

OUR book, "The Development of an Idea" will give you a brand-new conception of this subject. Send for it today—free.

The Engineer Company

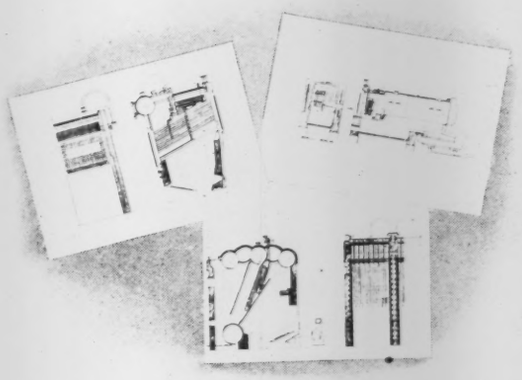
17 BATTERY PLACE NEW YORK

Balanced Draft

Produced exclusively by The Engineer Company

BRANCH OFFICES:

Boston Buffalo Chicago Cleveland Hazleton, Pa.
Minneapolis St. Louis Pittsburgh Philadelphia
Montreal



Send for an ELESCO

Superheater Installation Blueprint

It won't cost you a cent.

You can see at a glance how simple it is to install the Elesco Superheater in the particular type or size boiler you have in mind.

The Elesco requires no changes to the boiler settings.

It may be applied to any size or type boiler.

There are no troublesome hand holes or gaskets, because the metal to metal ball joint between each unit and the header eliminates them.

You can save from 5% to 15% in fuel cost when you install the Elesco. Let us prove it.

Fill out the attached coupon and mail it today, so that you may have the blueprint promptly.

LOCOMOTIVE SUPERHEATER CO.

General Offices—30 Church St., New York

Pittsburgh, Oliver Bldg. Chicago, Peoples Gas Bldg.

Designing Engineers
and Manufacturers of Steam Superheaters
for All Purposes

Locomotive Superheater Co.,
30 Church St., New York.

Please send me a Blueprint of the Elesco Superheater applied to a..... .....Type or Make Boiler of approximately.....Horse Power.
Send Bulletins FT-1 and FT-2.

NAME..... TITLE.....
COMPANY..... .....
ADDRESS .....

ASME 12

ILLINOIS *chain grate* STOKERS

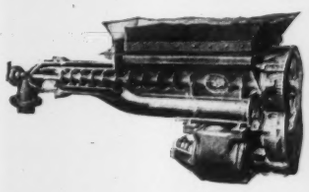
The exclusive induced down-draft feature built into every Illinois Stoker insures rapid and vigorous ignition, while an even and intense combustion is provided by our forced up-draft system, over which the operator has perfect independent control at any point throughout the length and width of the fuel bed.

Investigate the Illinois

The Illinois Stoker Company

Alton, Illinois

Clean Boiler Room



LOPULCO FEEDER

LOPULCO systems are air-tight and dust-proof.
There is no leakage of coal from the equipment.
There is no smoldering, sulphurous smoke from the fire box.
Your boiler room can be as bright and clean as your engine room.

Lopulco Pulverized Fuel System

PULVERIZED FUEL EQUIPMENT CORPORATION

International Pulverized Fuel Corp.

30 Church Street, New York

R. D. COLE MANUFACTURING CO.

Established 1854

NEWNAN, GEORGIA

Manufacturers of Boilers, Engines, Elevated Tanks, and Steel Plate Work

Boilers: Horizontal, Tubular and Manning
Elevated Sprinkler Tanks
Fabricated Structural Steel
Steel Plate Work
Special Gray Iron Castings

SEE OUR DATA IN 1919 A.S.M.E. CONDENSED CATALOGUES OF MECHANICAL EQUIPMENT

CLEAN PRODUCER GAS

For

Long Line Distribution

99.5% CLEAN 99.5%

Replaces

Fuel Oil, Natural Gas, City Gas

On

All Kinds of Heating Work

THE SMITH GAS ENGINEERING CO.

DAYTON, U. S. A.

Sole Canadian Representatives:
The Canadian Allis Chalmers Ltd., Toronto, Canada.

FULLER-LEHIGH PULVERIZED COAL EQUIPMENT

Pulverizer Mills, Crushers, Dryers, Pulverized Coal Feeders. Especially adapted to Steam Boiler, Billet, Forging, Annealing, Puddling, Open Hearth, Nodulizing, Ore Roasting and Rotary Calcining Furnaces

THE SATISFACTORY PERFORMANCE OF OUR PULVERIZED COAL EQUIPMENT WARRANTS YOUR INVESTIGATION. ASK US TO SEND YOU CATALOGUE NO. 71.

FULLER-LEHIGH COMPANY

Main Office and Works, FULLERTON, PA., U. S. A.

New York, N. Y., 50 Church Street
Chicago, Ill., McCormick Building
San Francisco, Cal., 719 Sheldon Building
Seattle, Wash., 714 L. C. Smith Building
25 Victoria Street, Westminster, S. W. I., London, England

FUEL ECONOMY IS OF VITAL IMPORTANCE

SUPERHEATED STEAM SAVES STEAM AND FUEL

FOSTER SUPERHEATERS

Are Built for Installation in All Types of Boilers—Also for Separate Settings

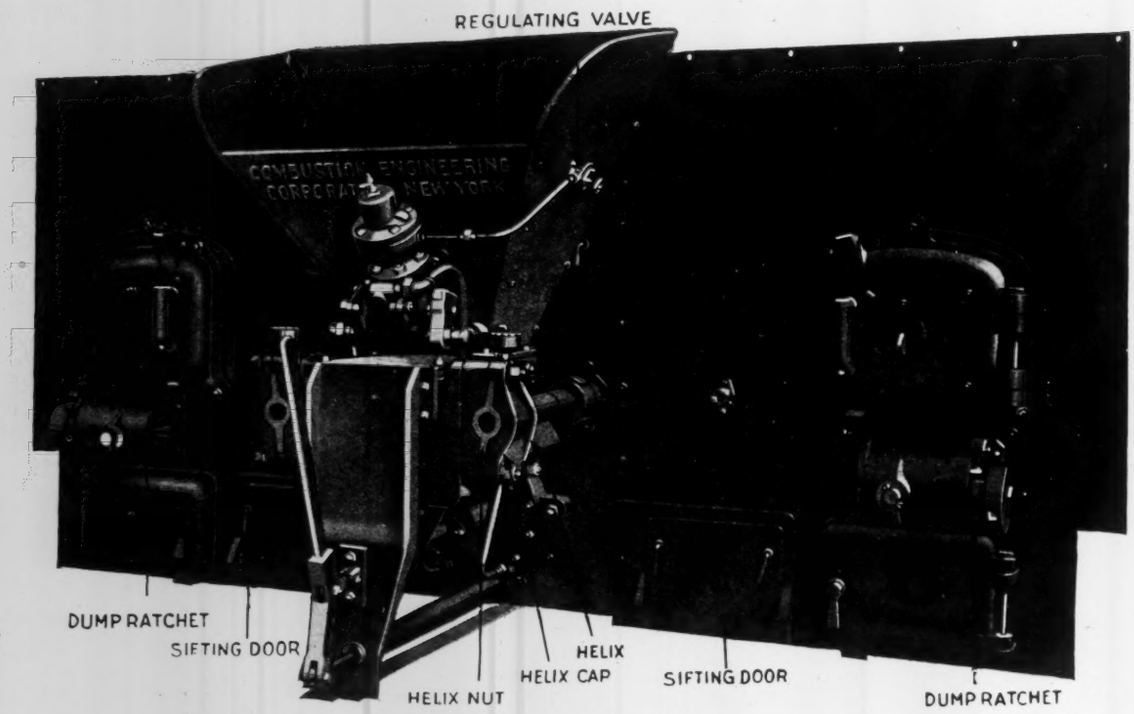
ENGINEERING REPORT ON WHAT THEY WILL SAVE FOR YOU ON REQUEST

CHICAGO
SAN FRANCISCO

POWER SPECIALTY COMPANY
111 Broadway, New York

BOSTON
PHILADELPHIA
PITTSBURGH

STANDARD



Wherever soft coal is burned and simplicity coupled with maximum results is sought

TYPE "E" STOKERS
ARE THE RECOGNIZED STANDARD

They are imitated but never equalled

Get in touch with us

Combustion Engineering Corporation
11 Broadway, New York City

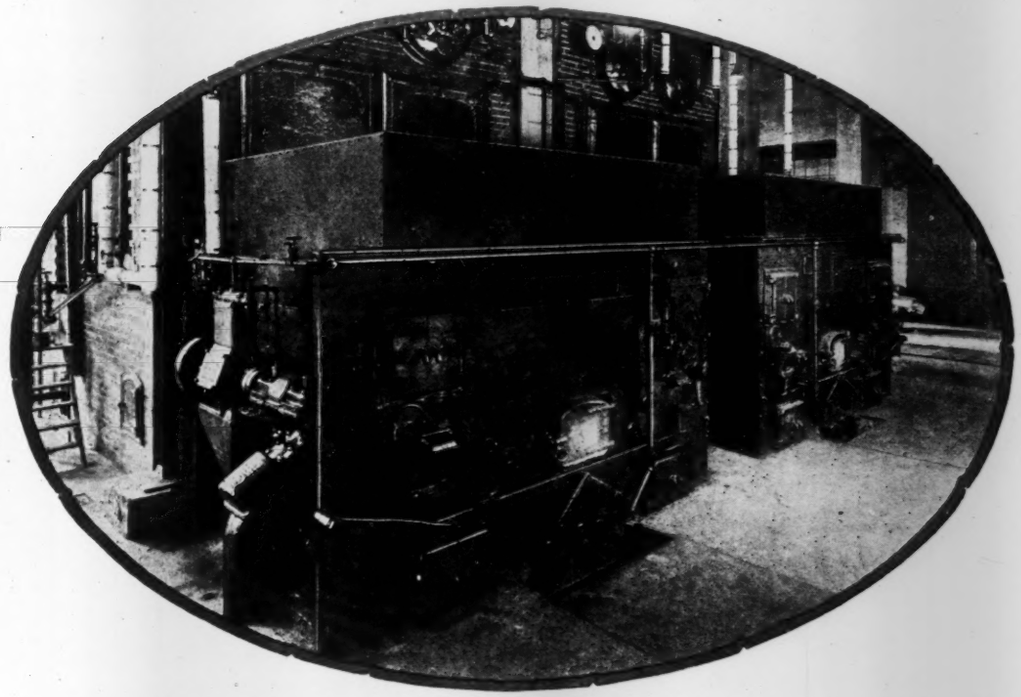
Owners and manufacturers of

Type "E" Stokers—for Bituminous Coal — The Grieve Grate—Hand-Firing
Coxe Stokers—Anthracite Coal and Coke Breeze

PHILADELPHIA, PA. PITTSBURGH, PA. MINNEAPOLIS, MINN.
BIRMINGHAM, ALA. HAZLETON, PA. BOSTON, MASS. CHICAGO, ILL.
SEATTLE, WASH. SALT LAKE CITY, UTAH ALBANY, N. Y.
DENVER, COLO. OMAHA, NEB. TAYLOR ENGINEERING CO., VANCOUVER, B. C.

Back for More

After 20 years of Operation



In 1897 the National Lead Company of Cincinnati installed two Murphy Automatic Furnaces under two 250 horsepower B. & W. boilers. These stokers were so successful in their operation that when the National Lead Company remodeled its plant twenty years later they naturally chose the same dependable equipment:

MURPHY AUTOMATIC FURNACES

The one thing that every Murphy user likes best about his equipment is its dependability.

The Murphy Furnace is heavily built and well protected—this means low maintenance. The design and construction is as nearly fool proof as forty years of stoker experience can make it. The Murphy Furnace is highly automatic in its operation and requires very little attention. The coal is fed—the fuel distributed—the fire cleaned—the ash and refuse continuously and automatically removed.

If you are interested in stokers that *burn anything that has heat in it*—stokers that last a life time—stokers that you will order again twenty or thirty years from now, then you should install the Murphy.

Your plant may offer large opportunities for saving. Let our Service Engineers investigate. Remember it is the forty years of stoker experience that place the right equipment in your plant.

Send for Catalog A-12

MURPHY IRON WORKS, Detroit, Michigan

BURN ANY FUEL THAT HAS HEAT IN IT

The Taylor Stoker

—more than a "Stoker"

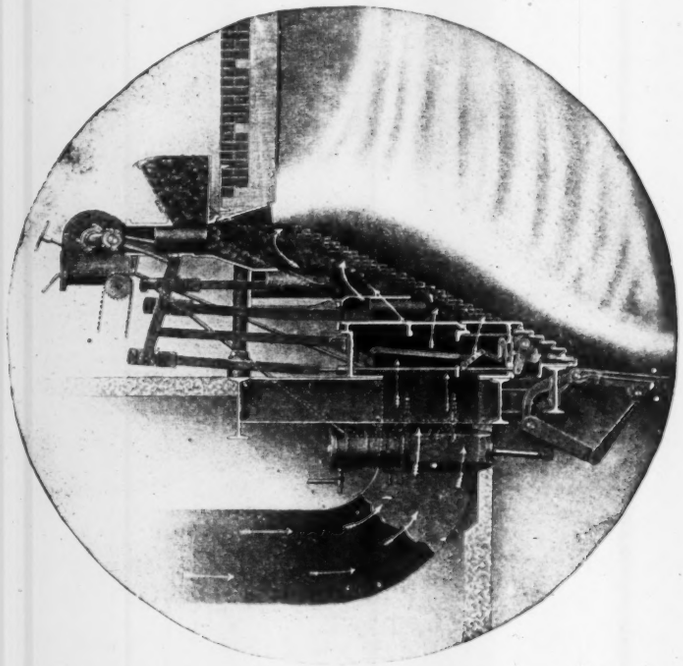
A Complete SYSTEM of Scientific Combustion

How the

Taylor System

meets the 6 basic demands of boiler plant efficiency:

6-Adding New Units



As we pointed out in our preceding advertisement, an outstanding feature of Taylor Stokers is the ***greater percentage boiler capacity*** obtainable.
Thus the power plant provides in part for ***future growth,*** by the use of equipment which is more than ample for its ***present load***. A Taylor-Stokered boiler plant, for a given steam output, can be installed in two-thirds, or less, of the area commonly demanded, with a proportionate reduction in the cost. This makes it possible to install additional units at minimum cost, in addition to which the ***ultimate operating cost*** of a ***Taylor Stoker*** is the LOWEST per developed horsepower.
Also, should the rapid evolution in power plant equipment make necessary the entire remodeling of your plant or even the discarding of the entire apparatus (in say 10 years), this consideration of the ***low cost*** of a Taylor-Stokered power plant becomes of great importance.

Send for the new Taylor Stoker Catalog, Engineers' Edition

THE 6 DEMANDS

When the American Smelting and Refining Co. of Omaha, Neb., installed Taylor Stokers, these were their six boiler plant requirements:

1. Continuous operation
2. Minimum Labor
3. Utmost simplicity
4. Ready Accessibility
5. Maximum capacity
6. Provision for future plant growth

How Taylor Stokers meet these demands is told in this series of advertisements.

American Engineering Company

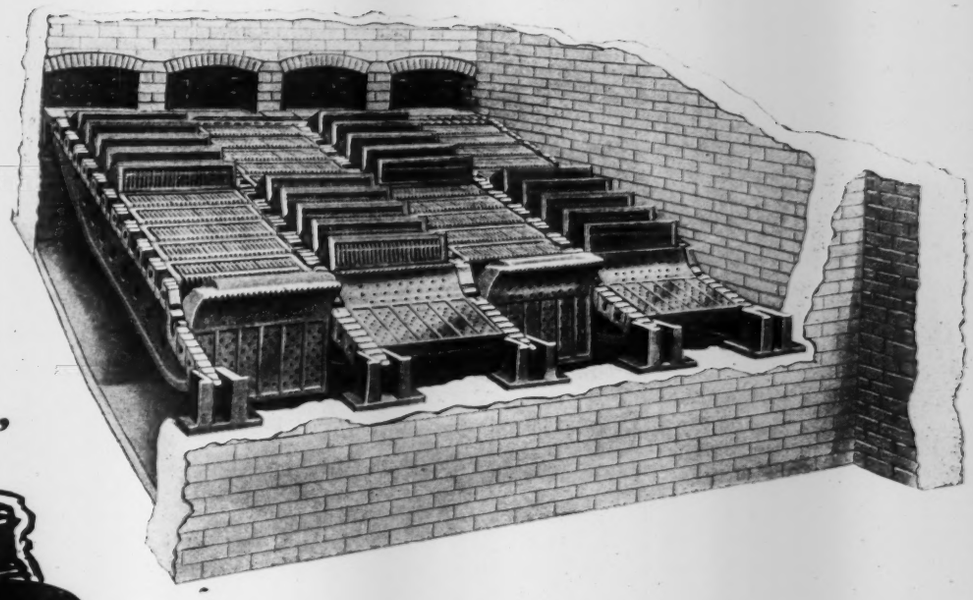
Philadelphia

Foreign Licensee: Babcock & Wilcox, Ltd., Oriel House, Farringdon Street, London, England

The TAYLOR System of Scientific Combustion

The Taylor Stoker

The Fireman's Friend



"I'll Say It Is"

"I used to think a fireman's job was the limit. It is in some power plants. Here it's a picnic! **Files Stokers,** Hand Operated, did it.

"After I throw in a few shovels of coal on the coking plate, I close the fire doors and take it easy. No slicing or raking—no broiling alive cleaning fires of ash and clinkers.

"Notice how those stokers slope to the rear? That helps a lot. By the levers I keep the coal moving slowly to the rear. It gives up the gases gradually and these are consumed as they pass over the fire. The stoker bars keep the firebed even, fine ash falls through into the pit, and **all that's burnable is burned** by the time the cleaning plate is reached. The cleaning plate is counterbalanced, so a simple, easy pull thoroughly cleans your fire.

"It's as good as a movie show! And the combustion's just grand! It's smokeless, too. Look at the stack! That doesn't lie.

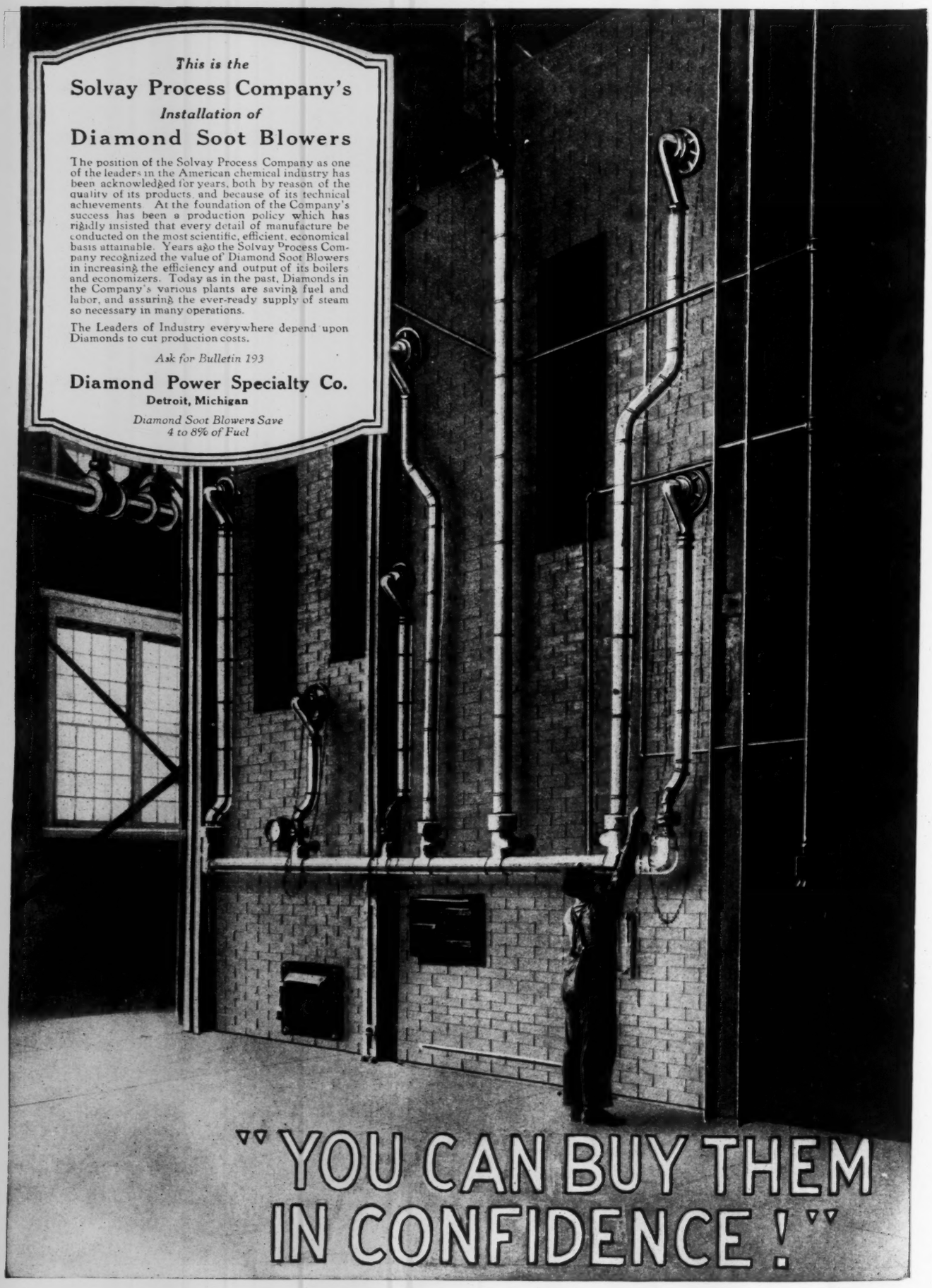
"Mechanical stokers cost like thunder to install and operate. That's why the Old Man picked the **Files**—it **doesn't.** But it keeps our boilers steaming to capacity—**and then some."**

Our booklet fully describes the construction and operation of Files Stokers, Hand Operated. Write for a copy.

THE FILES ENGINEERING CO., Inc.

75 Westminster St., Providence, R.I. Branches in Principal Cities

FILES STOKER Hand Operated


This is the
Solvay Process Company's
Installation of
Diamond Soot Blowers
The position of the Solvay Process Company as one of the leaders in the American chemical industry has been acknowledged for years, both by reason of the quality of its products, and because of its technical achievements. At the foundation of the Company's success has been a production policy which has rigidly insisted that every detail of manufacture be conducted on the most scientific, efficient, economical basis attainable. Years ago the Solvay Process Company recognized the value of Diamond Soot Blowers in increasing the efficiency and output of its boilers and economizers. Today as in the past, Diamonds in the Company's various plants are saving fuel and labor, and assuring the ever-ready supply of steam so necessary in many operations.
The Leaders of Industry everywhere depend upon Diamonds to cut production costs.
Ask for Bulletin 193
Diamond Power Specialty Co.
Detroit, Michigan
Diamond Soot Blowers Save
4 to 8% of Fuel
"YOU CAN BUY THEM IN CONFIDENCE!"

BUDD'S FACILITIES

BRASS FOUNDRY
All Metals of Aluminum, Bronze, Brass, Liberty Silver, U. S. Gov't and special Mix Castings. Non-shrinkable Metals for patterns. Castings to 3000 lbs. each.

BRICKWORK
Can furnish bricks, brick arches, combustion chamber arches, etc.

BOILER DEPARTMENT
Budd Patented Grates and **all other kinds of Grates** made to meet any requirement. Boiler Doors, Fronts, Arches, Dead Plates, Covering Bars, Stoker Castings, T Bars, etc.

IRON FOUNDRY
Famous Budd Heat Resisting Iron. Budd Machinable Sort Iron Castings to 10,000 lbs. each. Special Furnace Castings.

PATTERNS
Can be constructed to conform with blue prints, specifications, etc. All Metallic Pattern Work.

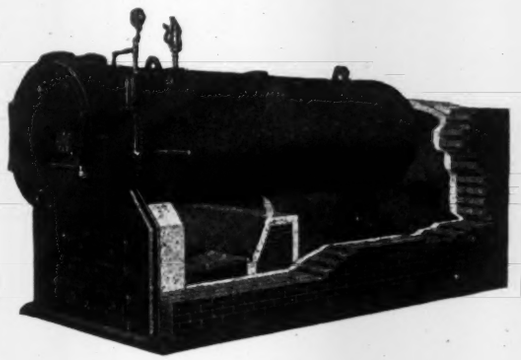
MACHINE SHOP
Can be of great assistance to you in repairing all kinds of machines, etc. We build machines and machine parts in small and large quantities, etc.

All facilities being on the one ground enables us to give you PROMPT EFFICIENT SERVICE **Let our engineering department advise you**

BUDD GRATE COMPANY

Offices: 2011-13 E. Letterly Street Works: Adams to Letterly Streets

PHILADELPHIA, PA.

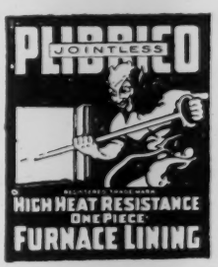


D

Keep the Heat Where It Belongs

PLIBRICO keeps the heat in the furnace, because it forms a jointless one-piece lining in your front door arches, entire fronts, side walls, arches, bridge walls, etc. This lining is gas and airtight, saves fuel while at the same time greatly reduces your furnace upkeep, will last longer, give better satisfaction and can be more easily repaired than a lining constructed of fire brick and fire clay.

Write for free copy of 36-page book of useful information on furnace building and maintenance



REG. U. S. PAT. OFFICE

Jointless Fire Brick Co.
1130 to 1150 Clay Street, Chicago
New York Office, 110 West 40th Street

Crescent Refractories Co.

PRODUCING

HIGH GRADE CLEARFIELD COUNTY FIRE CLAY REFRACTORIES

Three Modern Plants
CURWENSVILLE
Clearfield County Penna.

Every Engineer Knows

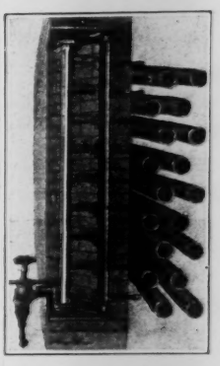
That soot and ash accumulations seriously impair boiler efficiency. Many have found by test and comparison the most satisfactory and economical method of removal is by use of the Bayer Steam Soot Blower. You can depend upon a THOROUGH job—with least time and labor requirement.

A Bayer Blower For Every Type of Boiler

There is a Bayer type or combination of types adaptable for every kind of boiler. Installation is quickly made, and savings to boiler users can be conclusively shown to be from 4% to 9% in fuel.

Write For Booklets

Let us send you our several free booklets, describing the Bayer as applied to boilers of various types, with full information, our guarantee and 60-day trial plan of selling. Write at once.



Bayer Steam Soot Blower installed on a vertically baffled boiler. Note convenience, also simple, substantial construction. No holes in brick setting.

BAYER STEAM SOOT BLOWER CO.
2838 La Salle Street **St. Louis, U. S. A.**

The BAYER Steam Soot Blower

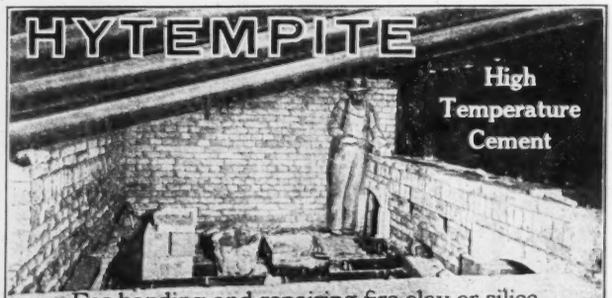
H. GORDON BRINCKERHOFF CO.

Manufacturers' Agents for products conserving

FUEL, LABOR *and*
INDUSTRIAL COSTS

10 HIGH STREET BOSTON, MASS.

HYTEMPITE



High Temperature Cement

For bonding and repairing fire clay or silica brick work, tile, retorts, crucibles, etc.

Ongley Furnace Specialties Co. Inc.
26 Cortlandt Street New York

WE-FU-GO AND SCAIFE
WATER PURIFICATION SYSTEMS SOFTENING & FILTRATION FOR BOILER FEED AND ALL INDUSTRIAL USES
WM.B.SCAIFE & SONS CO.PITTSBURGH.PA.

Founded 1802

Scientific Water Purification
of
MAXIMUM EFFICIENCY
and UNIFORMITY
FOR ALL PURPOSES

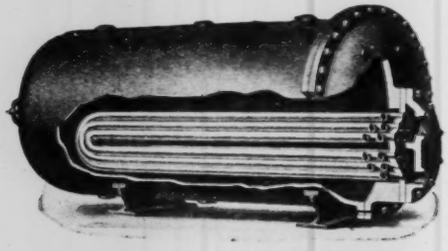
SEE OUR DATA IN 1910 A.S.M.E CONDENSED CATALOGUES OF MECHANICAL EQUIPMENT

New York Office: 26 Cortlandt Street

ANY BOILER SCALE IS TOO MUCH. WATER FROM AN INTERNATIONAL SOFTENER CAN FORM NO SCALE.

INTERNATIONAL FILTER CO.
WATER-SOFTENING AND FILTRATION PLANTS

38 S. Dearborn St. Chicago
Woolworth Bldg. New York



NATIONAL
U-BEND
STORAGE HEATERS

for the supply and storage of hot water. Furnished with or without auxiliary live steam generator

SIMPLE ECONOMICAL

Send for Storage Heater Bulletin No. 54

The National Pipe Bending Co.
162 RIVER STREET NEW HAVEN, CONN.

Manufacturers of Coil Type Feed Water Heaters, Direct Contact Open Type Heaters and Purifiers, Storage Heaters, Steam and Oil Separators, Coils and Bends of Iron, Brass and Copper Pipe

46-194

TEXACO

TEXACO
LUBRICANTS

Scientifically correct lubricants for every need of the

Steam Engine
Turbine
Air Compressor
Diesel Engine

or any other kind or class of equipment.

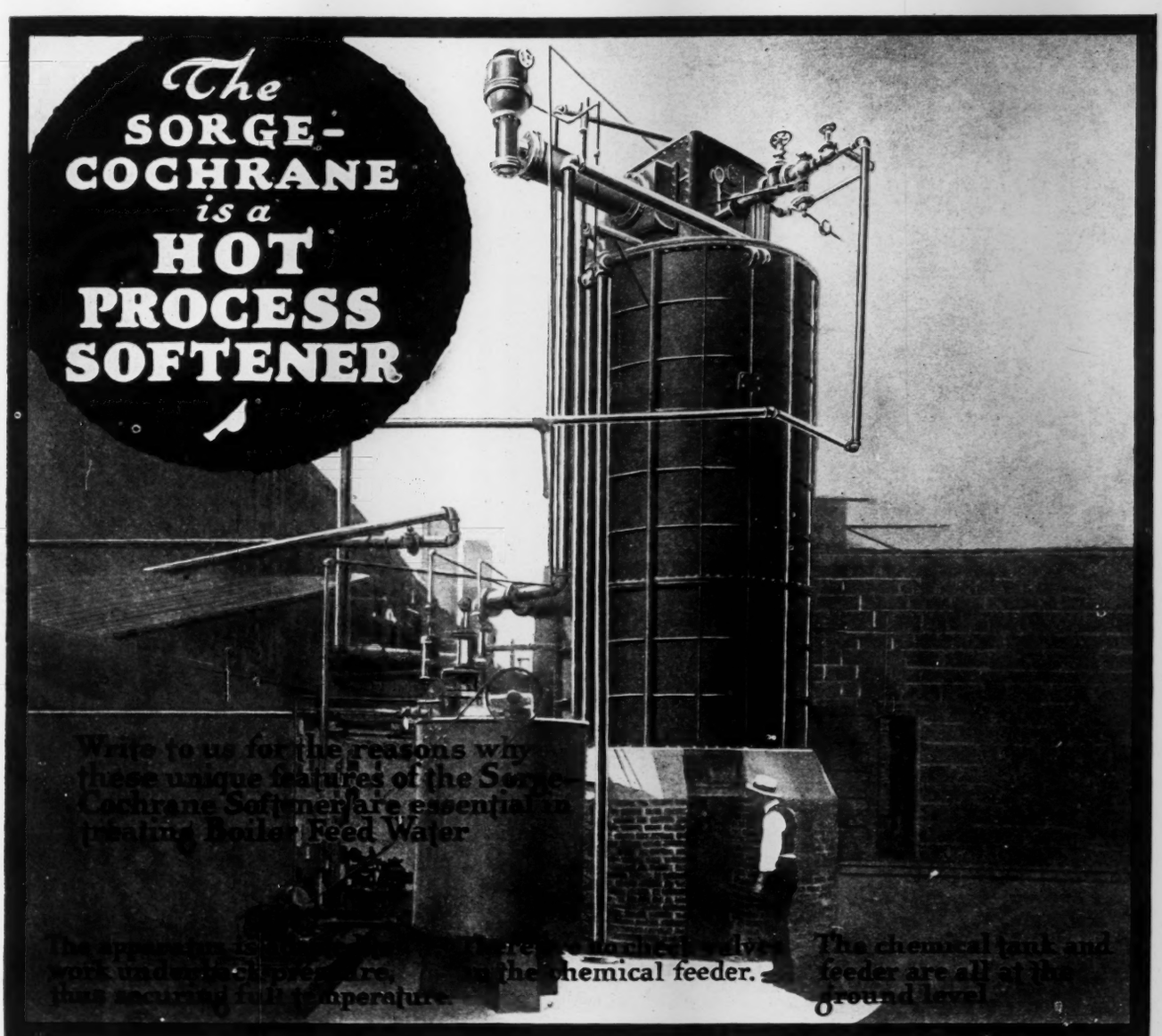
Texaco Engineers stand ready at all times to assist you in the selection of the right Texaco Lubricant for any purpose.

Put it up to them.

THE TEXAS COMPANY
17 Battery Pl., N. Y. City

New York Chicago Houston

Offices in Principal Cities



Outdoor installation of a Combination Sorge-Cochrane Hot Process Softener, capacity to soften and heat 4000 GPH. of well water and to heat 1200 GPH. of condensate

In This Softener Important Working Parts Are at the Ground Level

The chemical tank of the Sorge-Cochrane Hot Process Water Softener is located at the ground level, so that the chemicals do not need to be hoisted.

The chemical proportioner is attached to the chemical tank, where it is accessible and visible at all times, and where its proper operation can be tested and the discharge of measured chemical observed.

The chemical proportioner feeds the reagents in exact ratio to the amount of raw water entering the softener. The strength of the reagent is readily modified by varying the amount charged into the chemical tank. How much reagent to use is indicated by a simple daily test performed by the operator.

The accurate feeding of the reagents is not affected by the temperature of the water, as it is where saturators are used.

Besides the daily filling of the chemical tank and the testing of the treated water, about the only attention required is a periodical opening of the blow-off valve through which the sludge is discharged, and an occasional cleaning of the feed-water heater forming part of the softener.

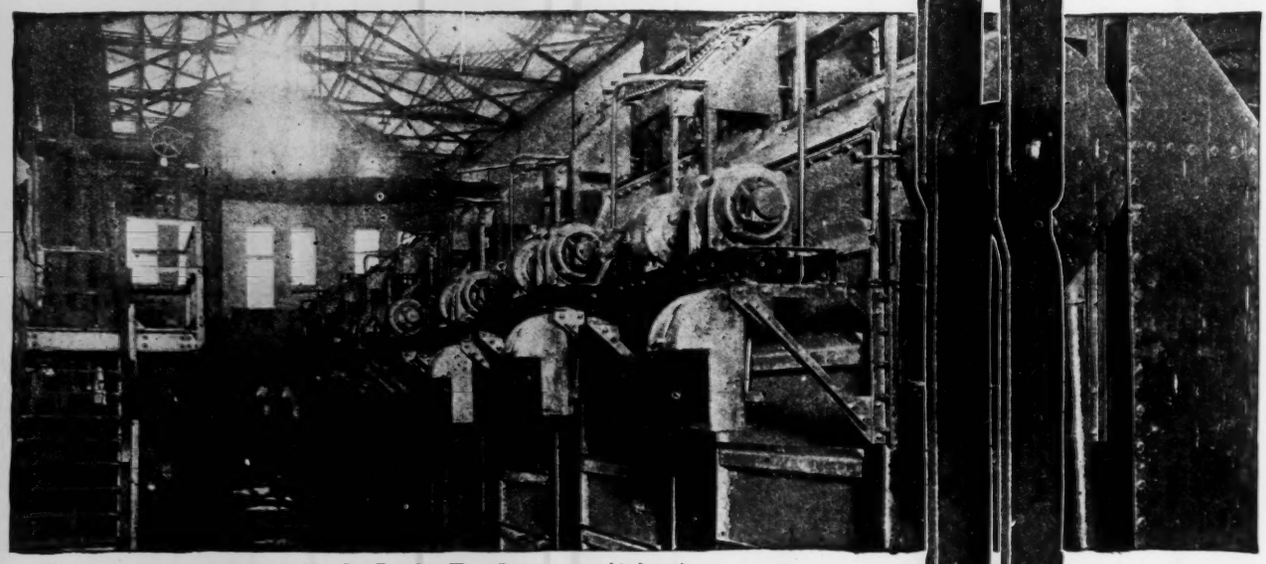
The Sorge-Cochrane Hot Process Softener has been developed and designed particularly for boiler plant service. It fulfills all of the requirements of a feed water heater and of a softener, and because of its compact construction can usually be installed in the boiler room, saving the expense of separate foundations and housing. There is likewise considerable saving in valves and piping.

If you are put to trouble and expense by reason of scale and corrosion in your boilers, you should at once give us your name and address, so that we may send you literature describing the latest developments and results.

Harrison Safety Boiler Works

3199 North 17th Street, Philadelphia, Pa.

Manufacturers of the celebrated Cochrane lines, including open feed water heaters, steam-stack and cut-out valve heaters and receivers, metering heaters and independent meters, Sorge-Cochrane hot-process water softeners, steam and oil-separators, and multiport back-pressure, atmospheric relief, flow and check valves S-8



In larger plants Rex Traveling Water Screens are used in batteries

In a Steel Plant

In a large steel plant there are several Rex Traveling Water Screens installed in a pump-house with two 10-foot tunnels extending to the lake. The lake-ends of the tunnels are fitted with bar gratings; 190,000,000 gallons of water at a 16-foot depth pass through the Rex Screens in 24 hours. 30,000,000 of this is used for surface condensers and the remainder for general purposes.

The Rex Traveling Water Screens are revolved only once a day to keep them clean, for ordinarily the water is very clean.

But schools of minnows come through the tunnels, and used to cause a great deal of trouble to the pump-house men—especially at night.

When this happened with the stationary screens one man had to climb into the crane carriage, and two others had to work at cleaning the screens—raising them, carrying them to the cleaning floor, turning the hose on them, and then returning and lowering them into place.

Now, when the minnows clog the screen so that a drop of water-level is noticed behind the screens, a pump-house man throws a switch, opens a valve controlling the pressure spray and almost immediately restores the needed head.

Rex Steel Roller Chain of Chabelco type used for carrying the baskets of Rex Traveling Water Screens

REX TRAVELING WATER SCREENS

Rex Chains, Rex Concrete Mixers and Pavers,
Rex Sprockets, Rex Elevators and Conveyors

CHAIN BELT COMPANY, MILWAUKEE

Branch Offices and Direct Representatives in Principal Cities in the United States and Abroad

Seamless Drawn Tubing

Made by Experts in Condenser work

Wheeler Crescent Brand tubing is made in all lengths and sizes, including iron pipe sizes. All shapes. Especially adapted to uses where the highest quality is essential as in condensers, evaporators, heaters, reboilers, etc.

Used exclusively in Wheeler Equipment—over 2,000,000 lb. per year.

You are invited to make use of our Research Department, which is constantly solving tube problems for our customers.

CRESCENT BRAND

Wheeler Condenser & Engineering Co.
Carteret, N. J.

CRESCENT BRAND

52

Manufacturers of Seamless Brass and Copper Tubes, Condensers, Vacuum Pumps, Centrifugal Pumps, Evaporators, Cooling Towers, Etc. Everything in the condensing line.

SPRACO

SPRACO Cooling Ponds

Assure a maximum of 28 in. vacuum all year

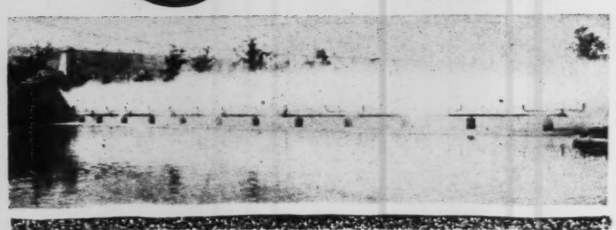
This is made possible by the wonderful efficiency of the Center Jet Nozzle, no others have it.

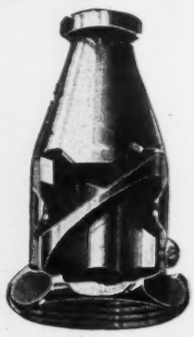
The Spraco Nozzle on account of this delivers a SOLID cone of Spray as against a hollow cone of ordinary nozzles.

Highest Cooling Efficiency.

Send for Bulletin C-22

SPRAY ENGINEERING CO.
BOSTON, MASS.





SPRAY NOZZLES *for* COOLING PONDS

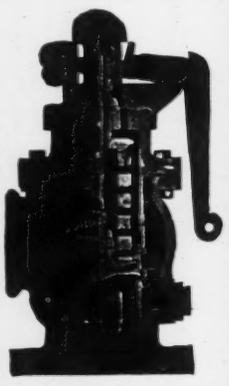
We specialize in spray cooling systems for steam condensing plants.

A copy of our Bulletin No. 4, with full particulars respecting the performance of spray cooling nozzles and method of installing will be sent to interested parties upon request

Write for your copy today.

"SPRARITE" CLOG PROOF SPRAY NOZZLES

The Star Brass Works
Manufacturers—Engineers
Carroll and Albany Avenue
Chicago



Ashton Pop Safety and Relief Valves

Pressure and Vacuum

Registering and Recording

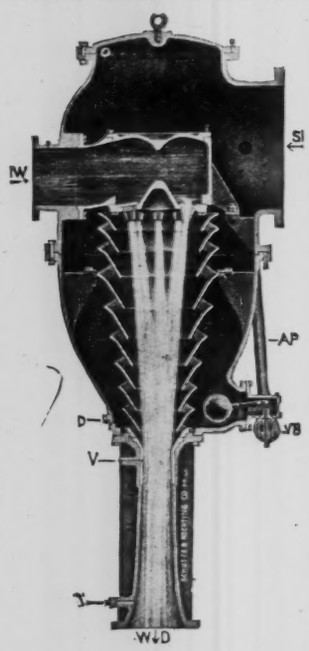
GAGES

Dependable in Quality and Service with an enviable record of over 40 years.

The Ashton Valve Co.
Boston New York
Chicago

SEE OUR DATA IN 1940 A.S.M.E. CONDENSED CATALOGUES OF MECHANICAL EQUIPMENT

KOERTING MULTI-JET CONDENSERS



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We invite your attention to the following features:

Compactness and low head room requirements.

Absence of a Separate Air Pump, the removal of the non-condensable gases being accomplished by means of water jets.

Utmost Simplicity of construction and reliability under the most severe operating conditions, making the Multi-Jet Condenser practically trouble proof.

Economic Operation, with auxiliaries comprising but ONE Standard Centrifugal Injection Pump, operating with highest hydraulic efficiency.

COMPLETE CONDENSING EQUIPMENTS OF ALL SIZES up to 10,000 K.W. Capacity.

For further particulars address Condensing Dept.

SCHUTTE & KOERTING COMPANY

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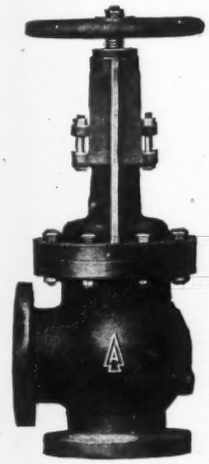
ANGLE VERTICAL or STRAIGHTWAY



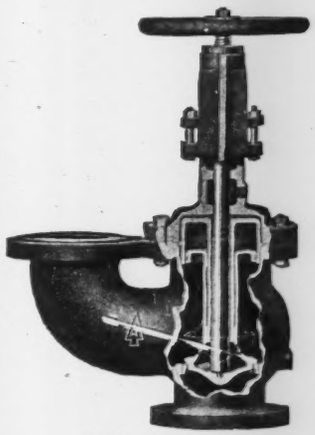
ANGLE

FOR

SUPERHEATED STEAM

CAST STEEL

MONEL MOUNTED

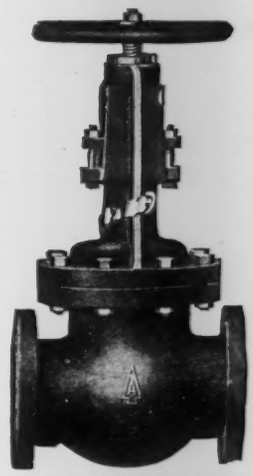


VERTICAL

SATURATED STEAM

SEMI STEEL

BRONZE MOUNTED



STRAIGHTWAY

SPECIAL FEATURES:—

UNDER SIDE OF DASHPOT OPEN TO PREVENT COLLECTING OF SEDIMENT.
EASY FLOW TO REDUCE BACK PRESSURE TO A MINIMUM.
ACCURATE AND POSITIVE ALIGNMENT OF DISC.
BALANCED DISC TO PREVENT HAMMERING.

Complete Piping Systems Furnished and Installed

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PITTSBURGH, PA.

Engineers **Founders** **Pipe-Fitters** **Machinists**

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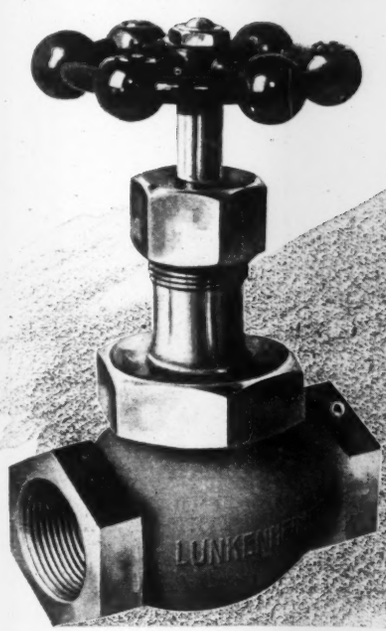
1

LUNKENHEIMER PRODUCTS



To the user they need no introduction—their high quality, reliability, and serviceability having made a lasting impression.

Others seeking the "better grade" of Engineering Specialties will find in those bearing the name

"LUNKENHEIMER"

that high quality of design, materials and workmanship which is synonymous of *the best.*

"LUNKENHEIMER PRODUCTS"

embraces a variety of high grade specialties for use on Steam Engines, Boilers, Locomotives, Steamships, Automobiles, Motor Boats, Airplanes, Tractors, etc.

Each device is designed for a particular purpose, and will perform the functions for which it is intended, with a *certainty* that insures safe, economical and reliable service.

Leading dealers everywhere sell *Lunkenheimer Products.* Specify and insist on having the genuine.

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"QUALITY"

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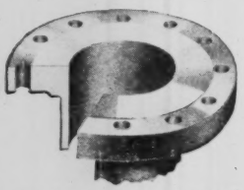
EXTRA HEAVY

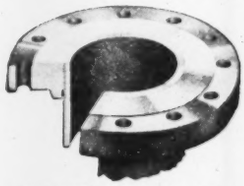
Flanged Pipe Joints

WITH CRANE CAST STEEL AND FORGED STEEL FLANGES



No. 295E. Craneweld Joint with Forged Steel Flange.

No. 181D. Cranelap Joint with Cast Steel Flange.



No. 281D. Screwed Joint with Cast Steel Flange

Cranelap flanges are highly recommended for use in connection with pipe bends.

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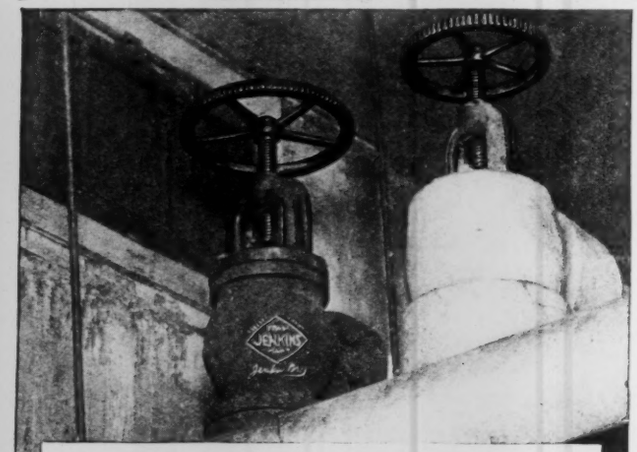

Extra Heavy Cast Steel Valves for high pressure super-heated steam service

Jenkins Cast Steel Valves meet the conditions of high pressure super-heated steam service by a wide margin. They are built to the proper shape with easy curves, uniform thickness, an absence of sharp corners and a correct distribution of metal, free from blow-holes and other imperfections, thus insuring a maximum of strength and rigidity.
Seat rings, discs, bushings and spindles are made of Monel metal, of high tensile strength, very hard, durable and non-corrosive, expanding and contracting the same as cast steel.

Know Jenkins Valves by the Jenkins "Diamond Mark"

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Jenkins Valves

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Steam Appliances

In Principle and Practice

None So Good

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For Our Product is Manufactured on Scientific Principles

OUR NAME AND TRADEMARK IS BEHIND EVERYTHING WE MAKE

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Crosby Steam Gage & Valve Co.

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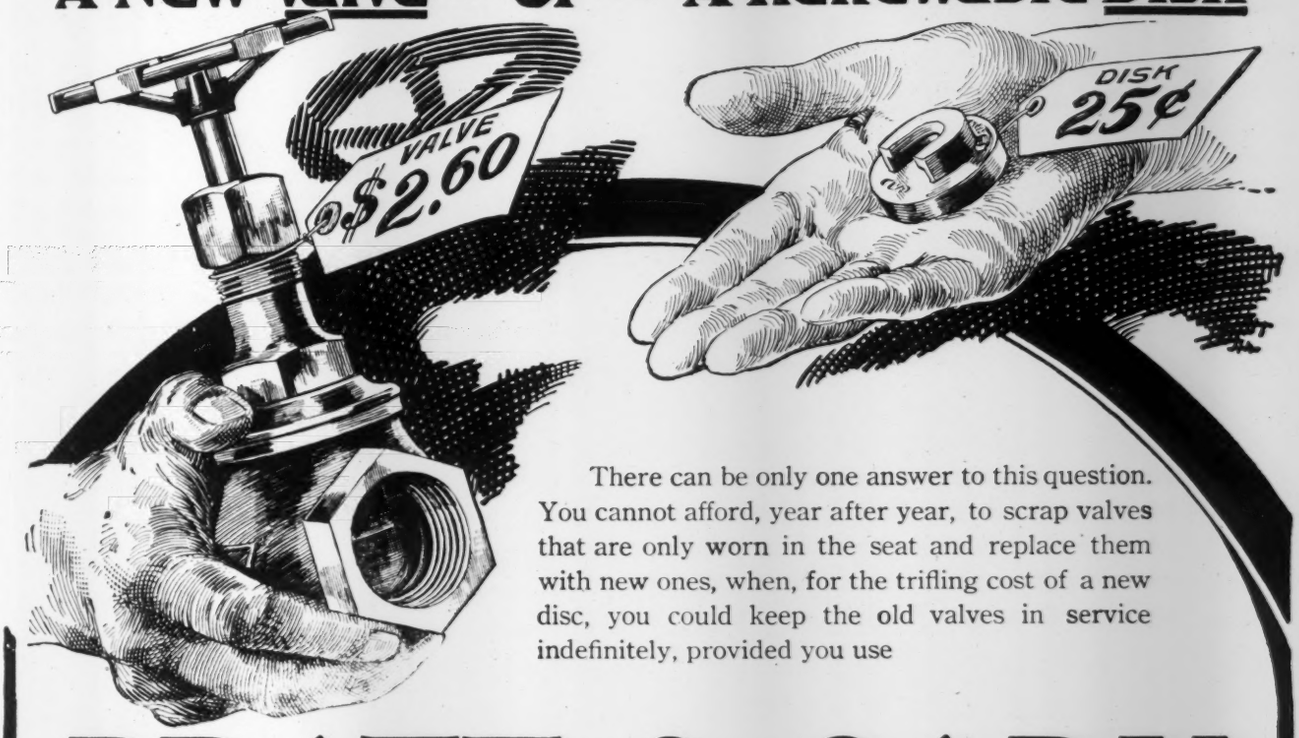
Which Would You Rather Buy ?

A New Valve — or — A Renewable Disk



There can be only one answer to this question. You cannot afford, year after year, to scrap valves that are only worn in the seat and replace them with new ones, when, for the trifling cost of a new disc, you could keep the old valves in service indefinitely, provided you use

PRATT & CADY

Renewable Disc Globe Valves

It requires only a few moments—just long enough to unscrew the bonnet and slip a new asbestos disc onto the end of the spindle—to make a Pratt & Cady Renewable Disc Globe Valve practically as good as new. And that can be done without removing valve from the pipe line.

All parts of a Pratt & Cady Valve are made of a superior grade of metal (no scrap) and accurate workmanship insures minimum wear.

This sturdy durability, together with the Renewable feature, makes every Pratt & Cady Valve a long-time investment.

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Manufacturers of Valves, Asbestos Packed Cocks, Feed Water Heaters, Hot Water Generators, Hot Water Service Heaters and Power Pumps

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No Packing
No Gaskets

Wrenches
The Only
Equipment

MR. Edw. G. Aicher, President of the South Easton Water Company, Easton, Pa., is an advocate of UNIVERSAL by reason of it giving the service demanded by his exceptionally high standard of efficiency.

3000 feet of 12 inch UNIVERSAL was ordered in 1914 for a pump line with a working pressure of 150 to 165 lbs. per sq. inch. This line came down a steep slope of the Lehigh River with excavation mostly thru rock. The crossing of the Lehigh required 800 feet of UNIVERSAL, laid while the river was at low water with a maximum depth of four feet and at a laying cost of about nine cents a foot.

This line also crossed a canal, two railroad crossings and a bridge.

During 1916 and 1917 more than 25,000 feet of 4, 6, and 8 inch UNIVERSAL was installed for distribution lines under a working pressure up to 130 lbs. per sq. inch.

Mr. Aicher states his experience with UNIVERSAL has been "very satisfactory and considers it superior to Bell and Spigot."

Painting Lead on Machined Surface Before Connecting Next Length

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FULL WEIGHT GUARANTEED

The Name and Year of Manufacture is rolled in every length as a guarantee of durability.

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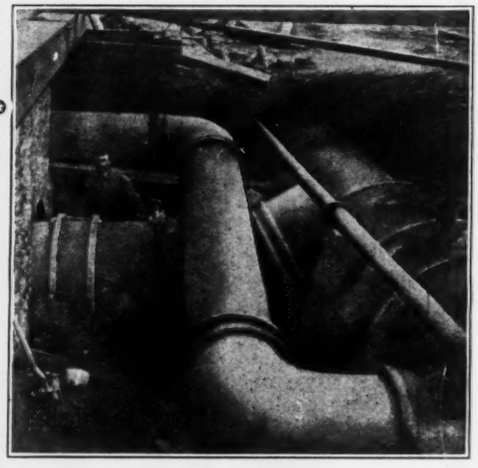

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Cast iron pipe will always prove a safe investment. It has proven its economy and durability many times. There are lines of cast iron pipe in use in this country today installed 112 years ago. In France pipe laid over 250 years ago is still giving excellent service.

All Sizes. 2" to 84" Diam. All Types

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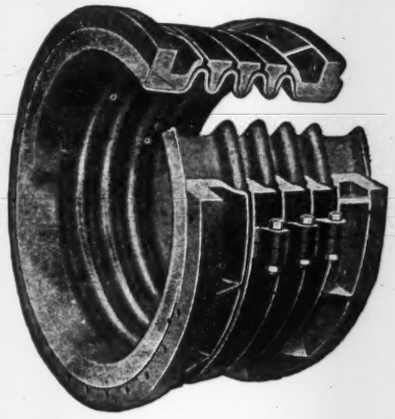

NECESSITY DEMANDS *the use of* BADGER SELF-EQUALIZING EXPANSION JOINTS

CHANGES in temperature cause material changes in length of steam, air, water, and other pipe lines. To care for these changes safely a Badger Self-Equalizing Expansion Joint should be installed in a pipe line, otherwise the pipe joints will work loose and leak, or the fittings may become fractured, due to the irresistible strain of expansion and contraction. ***Send for our new book of complete information.***

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Barco Flexible Joints

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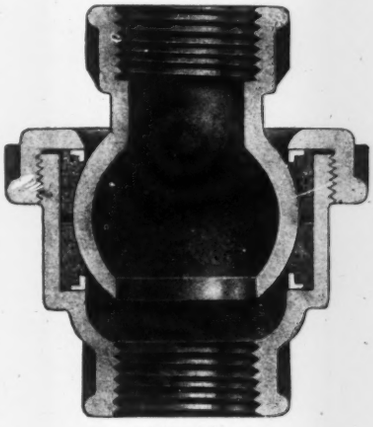
Use wherever a Flexible Connection is required for high or low Pressure, Steam, Vacuum, Water, Oils, Benzines, Naphtha, Air and Gas, in place of Rubber or Metallic Hose, Expansion Joints, Special Pipe Bends, etc. All styles, Straight, Angle, Male, Female and Flange ends.



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Power Plant Oil
Filters Remove *All* Impurities

The design of the R-P Power Plant Oil Filter assures the complete removal of every impurity—that the lubricating qualities of the purified oil are just as good as those of new oil.

Note the two accompanying illustrations. To the left is a cross section of the filter showing the filter units in the correct *vertical* position. To the right is a single filter unit. Each one of these units can be removed and cleaned in *one minute*, without interfering with the continuous operation of the filter.

Note, too, that the filtering cloth is smooth, free from folds or plaits, rendering every square inch active in filtering. The units being *vertical* the slime and sediment constantly works toward the bottom and drops off, tending to automatically keep the filter cloth clean.

Ask for Bulletin C-10

It contains complete information on this filter. We want you to have a copy of it. Write for it today.

THE RICHARDSON-PHENIX CO.
LUBRICATION ENGINEERS AND MANUFACTURERS
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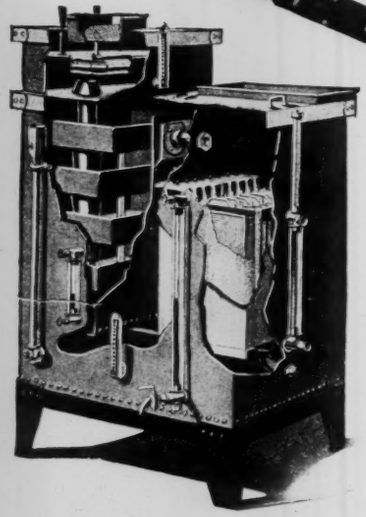

No. 5 R-P Type "A" Power Plant Oil Filter
Capacity, 100-200 gallons per hour.

Note how filter shown at right is secured in a *vertical* position—the only correct way.

R. P. Filtering Unit
showing method of placing filter bag over the frame. Note that the edges are smooth, so that the bag can be easily slipped on and off.

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OIL FILTERS
P
SCIENTIFIC LUBRICATION

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BAILEY FLUID METERS record and integrate the flow of low and high pressure steam; boiler feed, condensate, circulating water, brine and other liquids; also compressed air, natural gas, coke oven gas and practically any fluid at any pressure, temperature and capacity. Pressure and temperature records may be made on the same chart with the Rate of Flow.

BAILEY BOILER METERS accomplish more real results toward obtaining maximum efficiency and capacity than all other meters or instruments combined, because they record Rate of Steam Flow from the boiler and Rate of Air Flow through the furnace; and the relation between these two records shows whether an excess or a deficiency of air is being supplied for the support of combustion. Flue Gas Temperature, Wind Box Pressure, Stoker Speed, etc., may also be recorded.

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By way of proof—

we'll send you a supply of

GOETZE'S No. 2 Gaskets

on ninety days' trial

at our risk. You may send your order by "Night Letter" at our expense, if in a hurry. If it amounts to $10 or over we'll prepay the express charges to any point in the United States, and we'll do the same on any future order of like size. Send your trial order today, and learn a new, sure way to avoid trouble and expense in keeping flanged joints tight and right all the time.

"Have used no other gasket for ten years on our steam lines and heater heads," so says the Superintendent of a Massachusetts Street Railway Company.

Catalog of Packings for all Power Plant Purposes on request

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Gasket and Packing Company

New Brunswick, New Jersey

Live Steam is Money—Don't Let It Escape

It takes coal to generate live steam and it costs good hard-earned *dollars* to buy that coal—*more* of those dollars than it ever cost before.

Therefore, every bit of live steam that escapes from your steam trap means money out of your pocketbook.

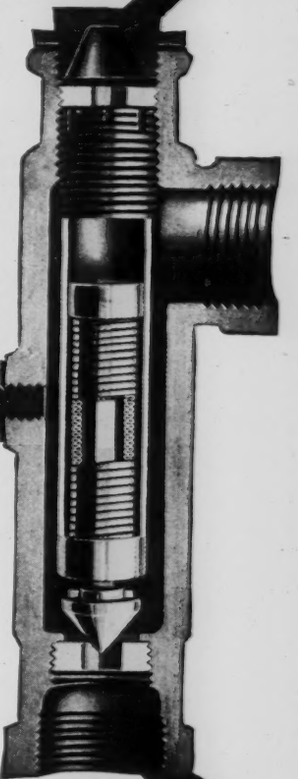
Keep that money in your pocketbook. If you have any steam-leaking traps around your plant, rip them out and put in the Steam Trap Sarco.

It positively does not leak live steam. That we guarantee when properly adjusted. You can prove this to your own complete satisfaction in the 30 days' free trial we give you on the

STEAM TRAP SARCO

Its knife edge blade absolutely prevents the loss of a *single cent's worth* of steam from one end of the year to the other.

Steam Trap Sarco operates hydraulically. The reliable expansion and contraction of a sensitive expansion element controls the valve. It drains off all condensation as soon as it is formed.



And it is so simple that it will outlast other traps. It has no complicated system of levers, gauges, etc., to get out of order and wear out. There is only one moving part.

Furthermore, the Steam Trap Sarco costs less than ⅓ the price of other traps. And it costs less to install because no building up, no supports and no floor space are required. Without changing the piping, it can be quickly installed at any angle, at any point on the line.

Guaranteed for any given pressure up to 200 pounds. Made in sizes ⅜" to 3".

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A double record on a single chart

Both provide evidence that shows whether conditions in the boiler room are wasteful or economical.

The quantity of feed water used, steadiness of feed and fluctuations in temperature are all graphically shown by a

YARWAY-LEA V-Notch METER

By filing charts in the book provided, a permanent record is always available.

The engineer has indisputable evidence of his ability to generate power at minimum cost.

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Write for Boiler Room Records and the Yarway-Lea V-Notch Meter.

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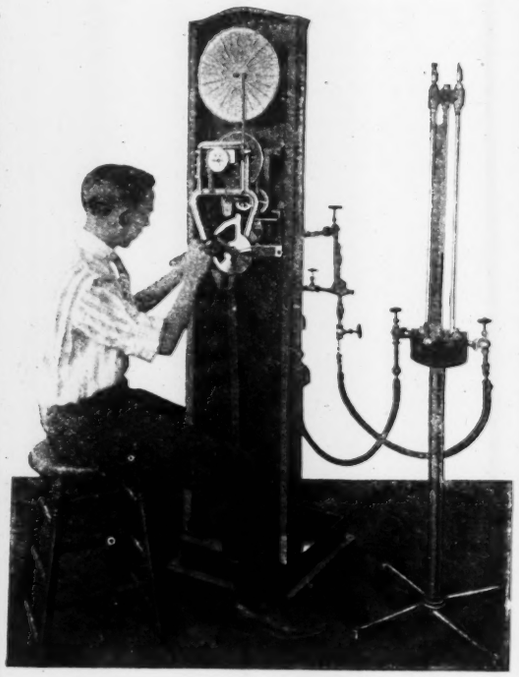

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48-Hour Test Before Shipment

Because the VENTURI METER TUBE affords a high differential pressure at the inlet and throat it permits the use of an unusually rugged registering device, which also indicates the momentary rate of flow on a 12-inch dial, and records the rate of flow on a circular chart.

VENTURI METER

Registers are, however, none the less accurate because they are rugged. They respond instantly to minute changes in the rate of flow and operate with a high degree of accuracy. This is because the readings from each device are tested before shipment by comparing them with the indications of a Single Tube Manometer. The Register also undergoes a hydrostatic pressure test of 300 lbs. per square inch for 24 hours. Minor faults are corrected by experienced workmen and defective parts are replaced. The entire test covers a period of 48 hours.

Literature describing the VENTURI for measuring hot or cold water, sewage, brine, chemical solution, oil, gas, air or steam will be sent on request.

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Indicating—Recording—Controlling

The three divisions of temperature work—indicating, recording, controlling—are all efficiently handled by *Tycos* Instruments.

- ***Tycos* Mercurial, Recording and Index Thermometers for all Industrial and Laboratory Applications**
- **Electric Contact Thermometers**
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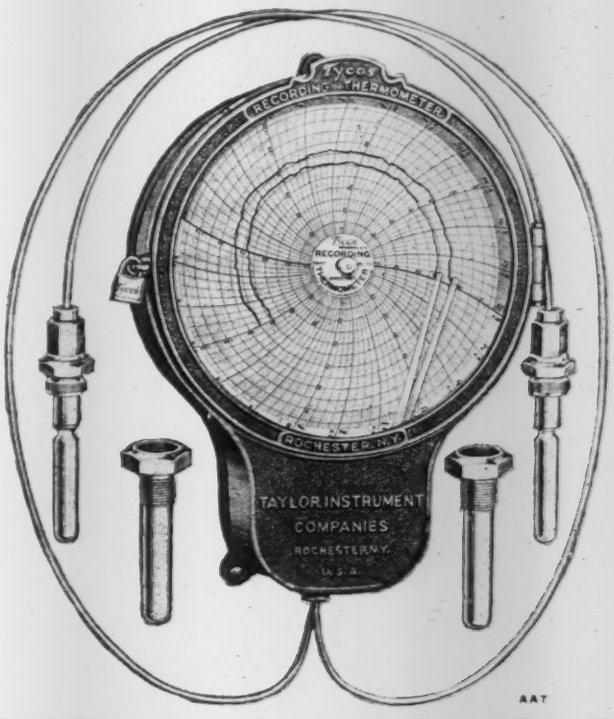
- ***Tycos* Base Metal, Rare Metal and Radiation Pyrometers (Indicating and Recording), Fery Radiation Pyrometers**
- **Hygrometers, Hydrometers**
- **Mineral Oil Testing Instruments**

Your temperature problems are doubtless special ones, but the *Tycos* makers have provided a force of skilled workers whose advice will prove a valuable asset in getting the correct application.
Write for this aid in your particular case.



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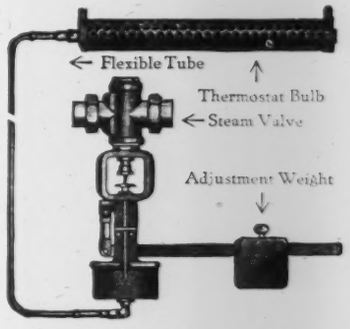
There's a *Tycos* or *Taylor* Temperature Instrument for Every Purpose

Eliminate the Human Element from heat control by specifying the

Powers Heat Regulator



Powers Regulator No. 15

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Wherever there is a need for maintaining a definite, even temperature the Powers Automatic Heat Regulator is your answer. The regulator shown at the right is the Powers No. 15. It is now used in thousands of dry kilns, varnish rooms, etc., and is fully described in our Bulletin 138. This is only one of the many types of Powers Regulators, some of which will exactly meet your requirements. Allow our more than 30 years of experience to be of service to you in your problem.

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SAVE COAL!

The Fuel Administrator says: "A big coal shortage is coming." But that need not worry *you* if you install

FOXBORO
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RECORDING THERMOMETERS

They give you an accurate and permanent record of temperatures by which you can control coal consumption in your plant and increase its efficiency.

Announcement: We have just issued the most complete *Thermometer Bulletin* ever printed. Eighty pages, more than One Hundred Illustrations, and an Index to help you to find what you want when you want it.

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A.C. and D.C.
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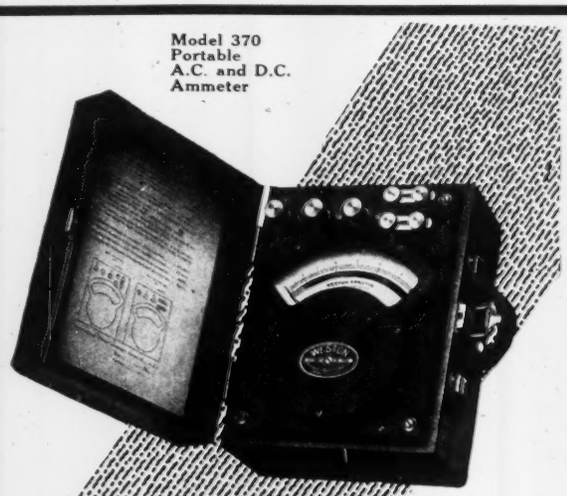

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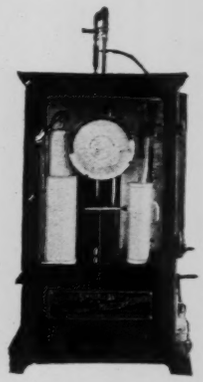

The percentage of CO_2 your fires are generating measures the efficiency of your furnace.

The Precision
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will give you every three minutes the exact percentage of CO_2 in your flue gases. This instrument is simple, accurate, and gives continuous satisfactory service with only ordinary care.

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Let us not lose a single moment in our effort to supply the enormous demands that will be made upon us by our own country as well as all parts of the world.

Let us clinch the trade that we have won by our superior capabilities and secure more and more of it that we may win the commercial supremacy deserving of our wonderful nation.

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Makers of Efficiency Promoting Instruments
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Help production attain to nearer capacity by running machines at maximum speeds and feeds. Help raise the effective effort of the operative by using the

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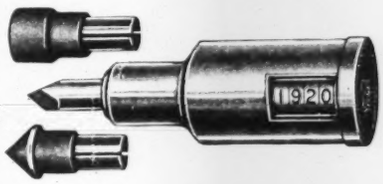
Speed Counter

—both in *finding* the correct R. P. M. and *maintaining* it under varying conditions of power delivery and mechanical adjustment.



Push-clutch starts or stops recording mechanism instantly, giving accurate R. P. M. readings without use of stop-watch. Price, $3.50. *Ask for the counter catalogue.*

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Why Guess? **You don't have to.**
Be sure of Your Speed.
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60 to 12,000 R.P.M. Hand Tachometer
You demand accuracy on your books, why not in your shop? The O. Z. Tachometer, operating either right or left hand, at any angle, at any speed or variations of speed from 60 to 12,000 R.P.M., is GUARANTEED ACCURATE. **Send for particulars.**
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FOR TESTS and EVERYDAY USES
Described in Pamphlet "P"
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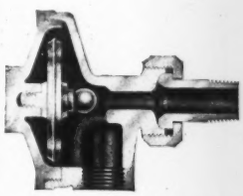
ILLINOIS VACUUM AND VAPOR HEATING SYSTEMS

are in successful operation in buildings of every type from coast to coast. The percentage of repeat orders from Satisfied Customers is exceptional.



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Air is expelled from the system at vapor pressures and the system is sealed against the return of this air.

This System will operate successfully over a Complete Pressure to Vacuum Range.

SIMPLE SAFE SATISFACTORY

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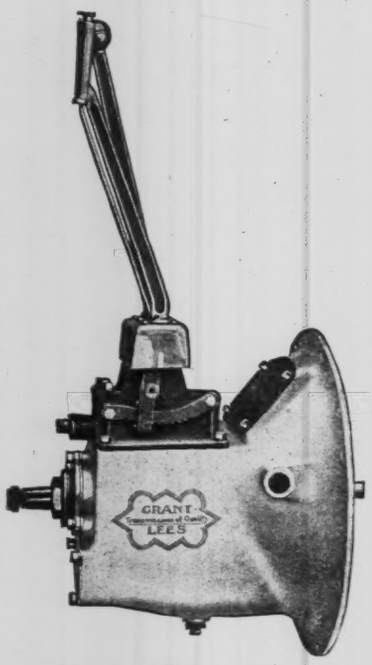

Grant-Lees Transmissions

Manufactured by

THE GRANT-LEES GEAR CO.
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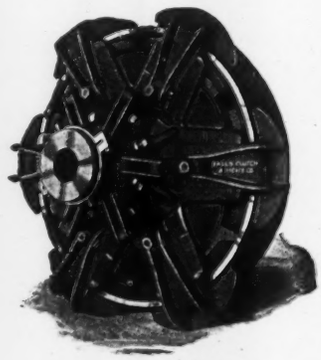

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FALLS Transmission Machinery is the result of a generation of technical research for obtaining proper efficiency. Falls Clutches are dependable with minimum frictional losses.

Full and complete line of

Bearings, Couplings, Head Shaft Hangers, Floor Stands, Base Plates, Etc.

Designed for service and durability.

Our Engineers are specialists on equipments for the economical distribution of power, and are always at your service.

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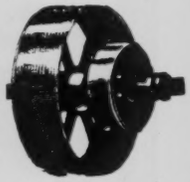

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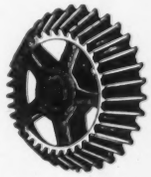
DESIGNED, FURNISHED AND ERECTED



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SPECIAL MACHINERY

IRON CASTINGS

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Collar Oiling Bearings
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Complete Power Transmission Machinery Equipments

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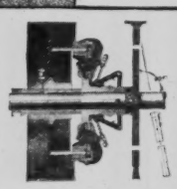

Hill Friction Clutch Pulley
Smith Type
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The Hill Clutch Co.
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Modern and Approved Appliances for the Transmission of Power

SHAFTING — HANGERS
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UNIVERSAL JOINTS AND PROPELLER SHAFTS

In 1904 SPICER UNIVERSAL JOINTS and PROPELLER SHAFTS were introduced to the industry. The soundness of their design received very prompt and general recognition by engineers.

The validity of this engineering judgment is well demonstrated by the fact that today SPICER UNIVERSAL JOINTS and PROPELLER SHAFTS are serving quietly, efficiently, enduringly on over one hundred of the leading makes of automobiles and trucks.

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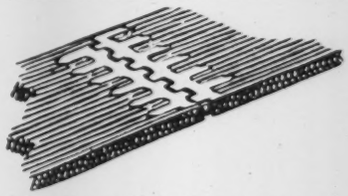

Alligator Steel Belt Lacing

A durable belt lacing that makes a strong, smooth joint. It is easily and quickly applied, a hammer being the only tool necessary. Saves time and labor and prevents costly shutdowns. Made for all sizes and kinds of belting.

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AMERICAN HIGH SPEED CHAIN

It would seem unlikely that any experienced engineer having under consideration the use of "high speed chain" for power transmission could seriously debate differences in construction as a factor in the life of one acceptedly standard chain as against another. There are too many years of "satisfaction rendered" in the service record back of each design of chain. The chain drives available today are entirely worthy of confidence.

But consider—American High Speed Chain, in addition to being a good product, is absolutely the simplest chain built, only three parts, consequently the easiest chain to handle. Apply American High Speed Chain where you will, and all the attention it may require can be provided by the most unskilled hands. This is a quality of importance to every engineer.

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National Distributor
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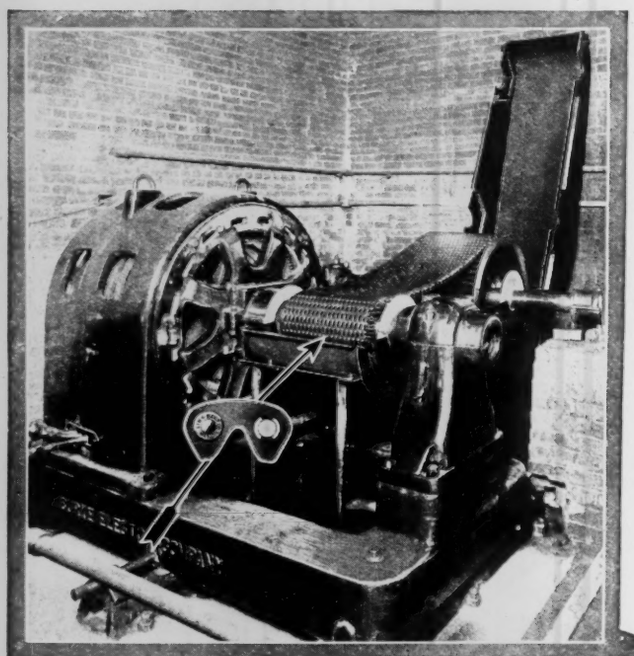

Why Link-Belt Silent Chain is the Correct Drive

COULD any other form of power transmission operate with efficiency on the short centers shown in these illustrations? This drive like hundreds of others, is operating almost continuously—it has never been shut down for repairs. The plant in which it is installed depends upon its constant daily performance.

Note the drive is enclosed in the patented Link-Belt oil-tight, dust-proof casing. Lubrication automatically reaches the chain. Safety to employees is assured. And the drive is, like all Link-Belt Silent Chain Drives, 98.2% efficient.

Let us show you where you can use an efficient Link-Belt Silent Chain Drive in your plant.

LINK-BELT COMPANY

384

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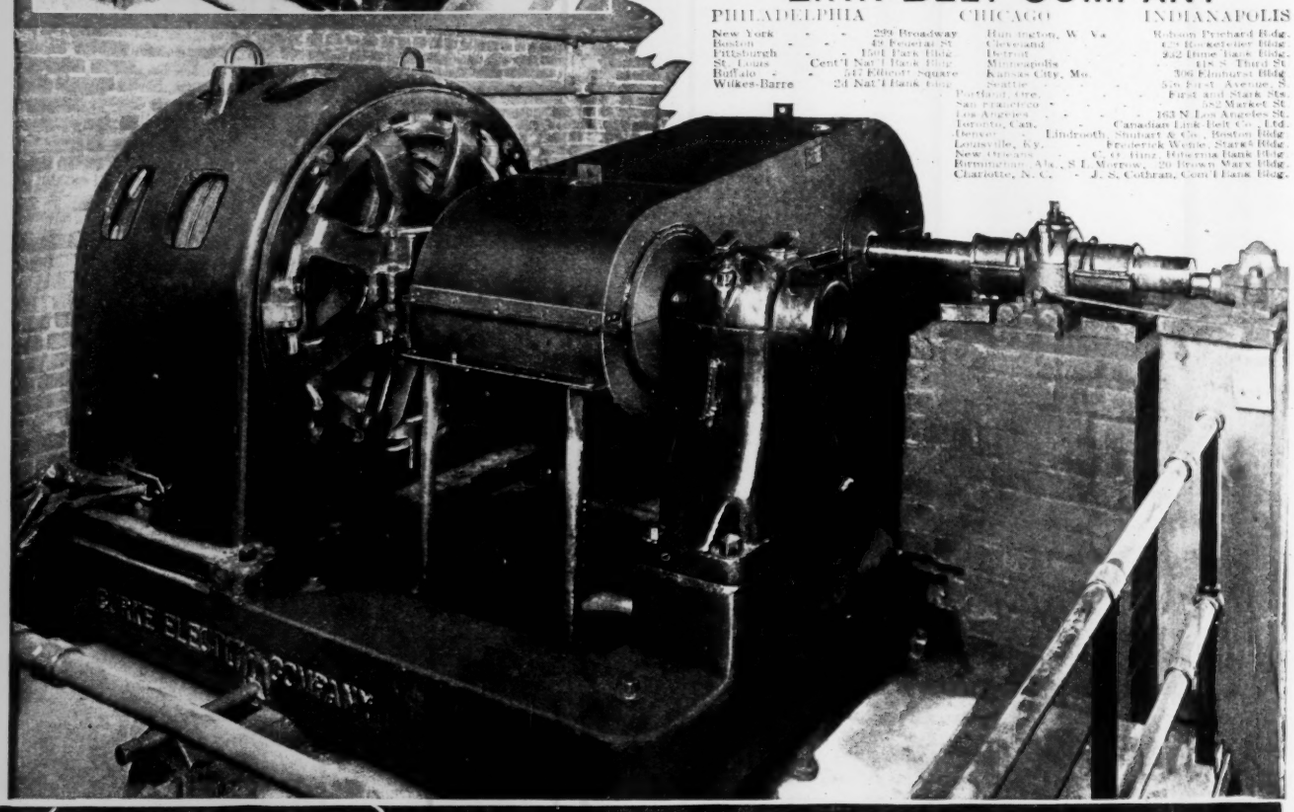

We Also Make

- ☐ Elevators and Conveyors
- ☐ Link-Belt and Sprockets
- ☐ Silent Chain Drives
- ☐ Truck and Tractor Chains
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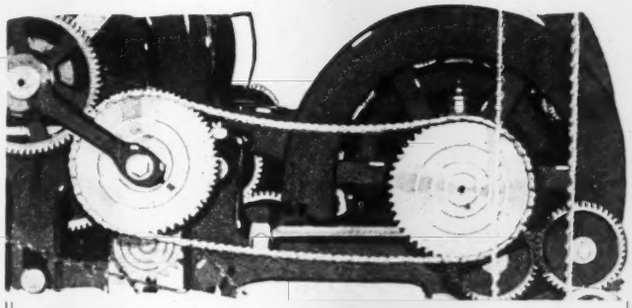
LINK-BELT
SILENT CHAIN DRIVES



AS engineers BALDWIN feels the responsibility for the design and proper functioning of every chain drive that leaves the BALDWIN factory, and as engineers you will appreciate the unfailing ability of BALDWIN engineers to assist you in designing difficult industrial drives.

BALDWIN CHAIN AND MANUFACTURING CO.

Worcester, Mass.

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Three Good Reasons Why You Should Use Hindley Worm Gears:

Great Durability
Greater Bearing Surface
Greatest Efficiency

Over Fifty Thousand Hindley Gears in actual service.
Our Engineering Department is at your command.

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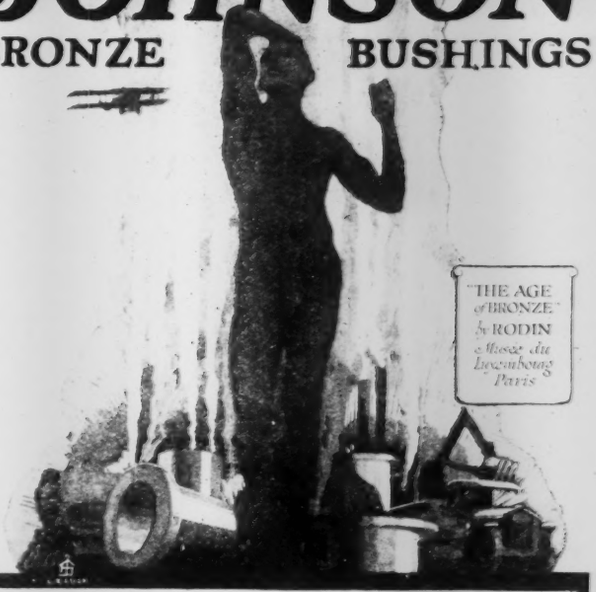
Hindley Gear Company

1105 Frankford Avenue **Philadelphia, Pa.**

JOHNSON BRONZE BUSHINGS



The Spirit of Bronze

Typifies the strength—the endurance and ruggedness of the product

Over twenty years of specialization have convinced manufacturers that the uniformity—permanence—dependability and quality required are always to be found in JOHNSON BRONZE BUSHINGS.

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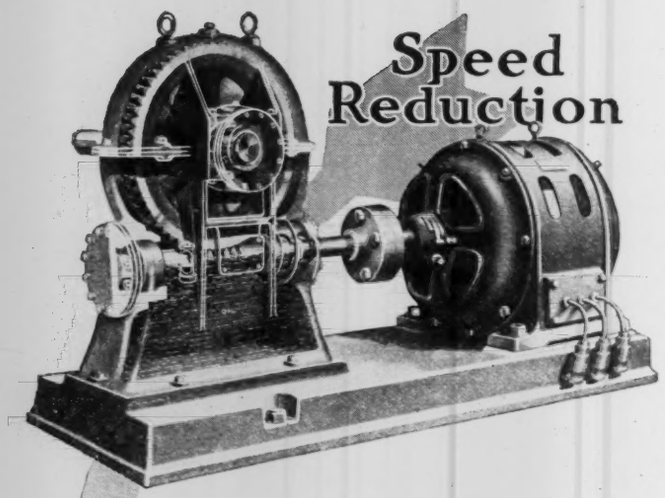

Solving The Speed Reduction Problem

If you use individual electric motors you can use Cleveland Worm Gear Reduction Units, somewhere in your factory. Wouldn't you like us to tell you where and how?

Those familiar with these Speed Reduction Units are amazed to learn how many practical advantages they feature over other forms of gear reduction.

Factory engineers, who are acquainted with what we have been doing in the way of gear reductions, for several years past, are astonished to find the perfection to which our product has been developed, and are quick to acknowledge the superiority of the Cleveland Worm Gear Reduction Unit just as soon as they know the actual results it accomplishes.

What are these results? Briefly summarized they include:

(a) ***Higher initial efficiency*** and greater maintenance of efficiency during the entire life of the gear with correspondingly lower cost of upkeep.

(b) ***Greater compactness***—especially when large ratios of reduction are required.

(c) ***Right angle drive***—frequently effecting an important saving of floor space.

(d) ***Silence in operation*** regardless of speed.

(e) ***Absolute uniformity*** of torque on drive shaft.

(f) ***Accessibility*** and entire absence of adjustments.

By the aid of these units it is possible to use less expensive high speed industrial motors with utmost economy and satisfactory service.

Bulletin No. 1, giving complete information, is now ready for distribution—a copy will be sent you on request.

Cleveland Worm Gear Company

"America's Worm Gear Specialists"
CLEVELAND, OHIO

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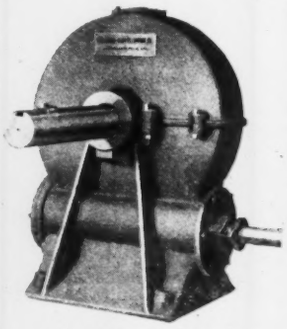
315 Euston Rd.
London, E.C.

ALFRED H. COATES CO.
41 Spear St.
San Francisco, California

CLEVELAND *WORM GEAR* REDUCTION UNITS



Worm Drives

Complete Ready for Power

HINDLEY WORM GEARING

Superior Contact and Load Carrying Ability

For Any H. P., Speed and Reduction Ratio

ALBRO-CLEM ELEVATOR CO.
507 Erie Avenue East Philadelphia, Pa.

FAWCUS HERRINGBONE GEARS

QUIET EFFICIENT

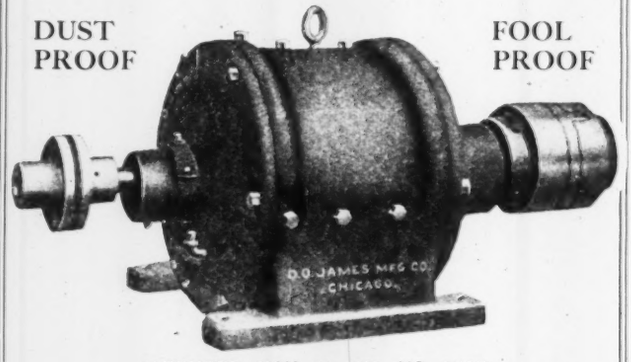
ENCLOSED GEAR DRIVES
FLEXIBLE COUPLINGS

SPECIAL MACHINERY

CUT SPUR = CUT BEVEL = CUT WORM = GEARING

FAWCUS MACHINE CO. PITTSBURGH, PA.

DUST PROOF FOOL PROOF



PATENTED NOV. 30, 1909—NO. 941925

JAMES ALL SPUR GEAR SPEED REDUCING TRANSMISSIONS

The best way to reduce your motors to the required driven speed.

Entire gearing encased. No dirt or dust can reach the working parts, and runs in oil. Built in a variety of sizes and speed ratios from 4:1 to 1600:1 or more — ½ H.P. to 100 H.P.

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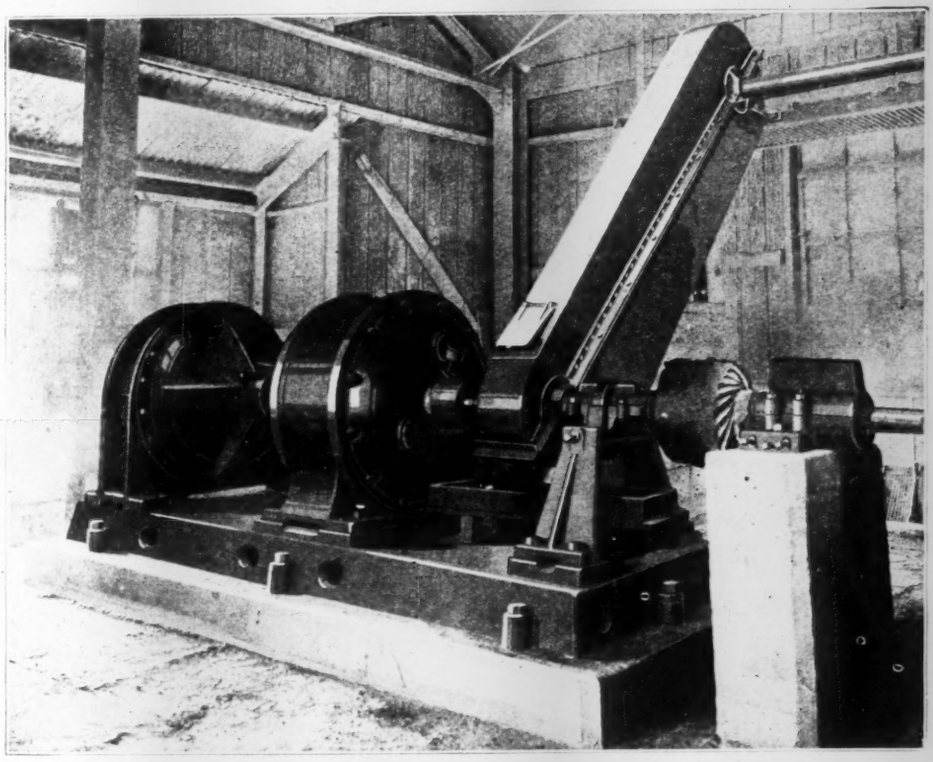
CHICAGO, ILLINOIS
Manufacturers of Cut Gears of all kinds.

CEMENT MILLS

Present Unusually Difficult Conditions



Yet Jones Speed Reducers

Continue to give uninterrupted, satisfactory service month after month and year after year

This is the reason why the largest cement, steel, coal and chemical industries place so many repeat orders for Jones Spur Gear Speed Reducers

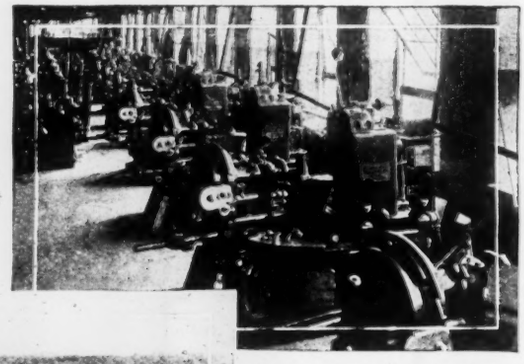
W. A. JONES
FOUNDRY & MACHINE CO.

4400 W. Roosevelt Rd., CHICAGO—NEW YORK, 30 Church St.

GEARS, CAST IRON PULLEYS, LEMLEY FRICTION CLUTCHES, COUPLINGS, PILLOW BLOCKS, HANGERS and GENERAL POWER TRANSMISSION MACHINERY

Fellows Gear Shapers

The Ten-Acre Plant of the New Process Gear Corporation



Gleason Spiral Generators

Spiral Bevel Gears Operate *Quietly*

They require *expert* gear-knowledge to make and when *built right* are a distinct asset to any car.

We have the largest equipment of any gear-manufacturer for producing *Spiral Bevel Gears*. Our factory can accept orders for differentials and meet *exacting delivery dates*. We also make gears for transmission.

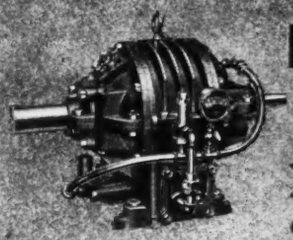
New Process Gears are backed by 26 years of progressive gear-building.

New Process Gear Corporation

Syracuse — *Member of the* — New York

AGMA

New Process Gears



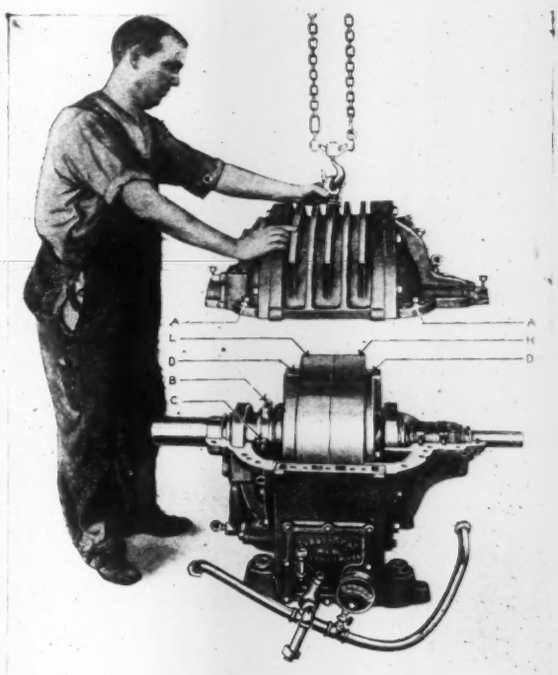
The IDEAL DRIVE

TURBO GEAR

FAST PATENTS

The Modern Way to connect Driving and Driven Units

Here is WHY Turbo-Gear Meets with Approval Wherever it is Installed



One of the important reasons for the excellence and economy of Turbo-Gear is the care and skill with which it is built.

The material for each part is carefully selected and every step of manufacturing is carried through with painstaking precision.

But the chief reason is the remarkable simplicity of construction.

Simplicity means less trouble and low up-keep cost.

Turbo-Gear is Dependable for *Uniform* Power at the *Right* Speed

This is economy of time, of labor, and of up-keep cost. Today — Economy and Sureness of operation are of primary importance.

Turbo-Gear steps speed up as well as down, and can be used wherever a positive, efficient change of speed is required.

Send for Bulletin No. 101 — it gives some interesting facts

POOLE ENGINEERING and MACHINE COMPANY

Manufacturers of Gears and Power Transmission Machinery since 1843

BALTIMORE, MD., U.S.A.

General Sales Office 50 Church St., New York, N.Y.

"NORMA" PRECISION BALL BEARINGS

(PATENTED)

The "one-hoss shay"—one time only an inspiration to a poet—today typifies the ideal which machine builders are striving to realize in their product. To build a machine of uniform time-and-wear-resisting capacity in every part—one that, when it fails, will fail "all at once and nothing first"—this is the machine builders' goal today.

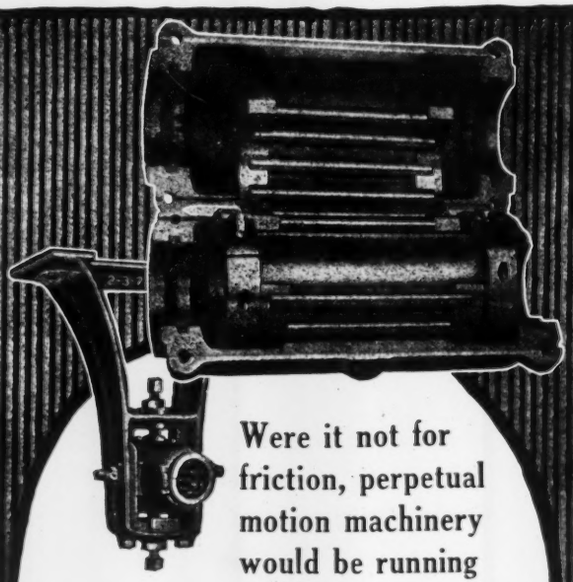
It is a matter of record that no machines are showing a more uniform degree of durability and wearability, than those in which "NORMA" Precision Bearings are used to minimize friction and vibration.

See that Your Machines are "NORMA" Equipped

THE NORMA COMPANY OF AMERICA

1790 BROADWAY NEW YORK

BALL, ROLLER, THRUST AND COMBINATION BEARINGS



Were it not for friction, perpetual motion machinery would be running trolley cars

Of course, you cannot entirely eliminate friction, but with roller bearings you can reduce it to a point where it uses up a negligible amount of power.

Before the leading industries adopted "Sells" Roller Bearings — while they were still trying out various types of bearings — they found that besides the power they save —

"Sells" Roller Bearings increase the life of belts, machines, motors, gears and other equipment because they reduce the strain to which these are subjected.

Overnight you can cut down the friction-load in your plant. "Sells" Roller Bearings are split and can be readily fitted to any standard hanger, post hanger or pillow block. The shaft is protected from all wear by steel split bushings. The rolls run parallel to the box and shaft; there is no end thrust.

If you are ready to take up the question of roller bearings in your plant our Service Department is at your convenience. Or we will send you our book containing a lot of interesting and worth-knowing roller bearing facts.

John D. Sells

Manager.

Royersford Foundry & Machine Co.

60 No. 5th St., Philadelphia

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"Sells" Roller Bearings for mine cars and wagons
Shaft Hangers, Collars and Couplings
Rollerine, the Ball and Roller Bearing Lubricant
Combination Oil and Grease Gun
Babbitted Ring Oiling Bearings
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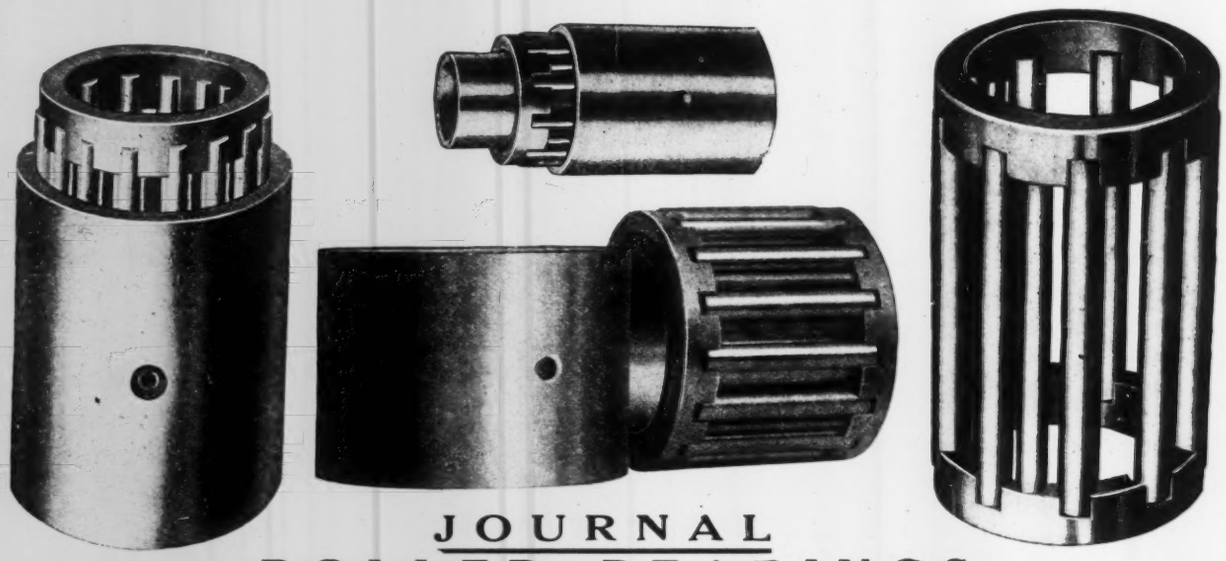

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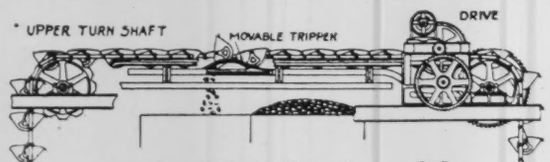

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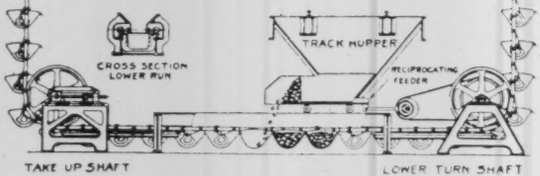

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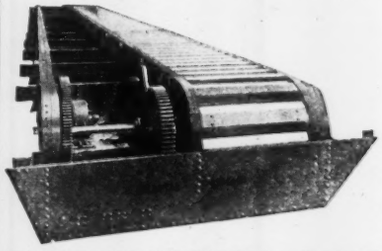

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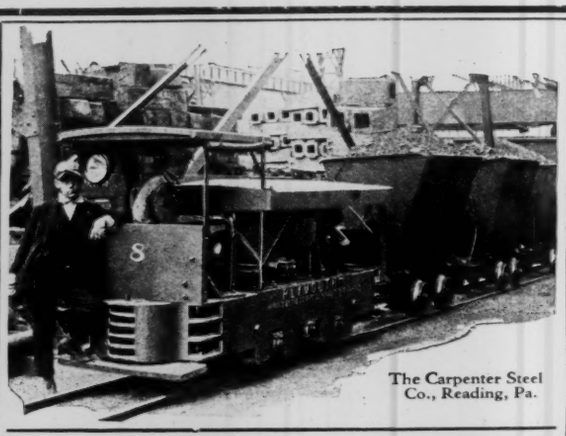

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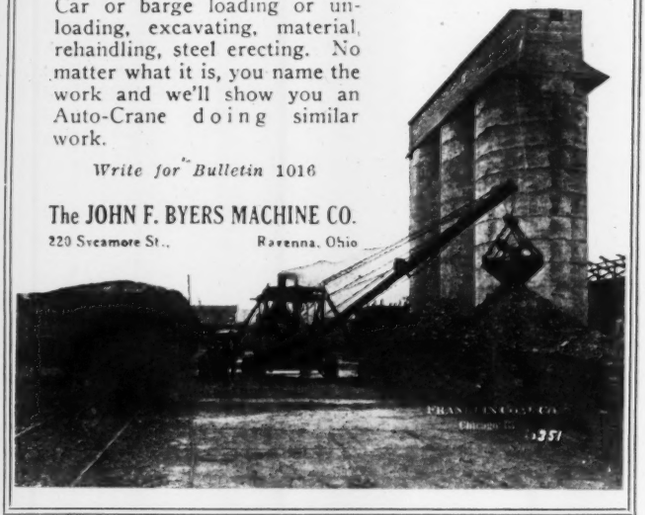

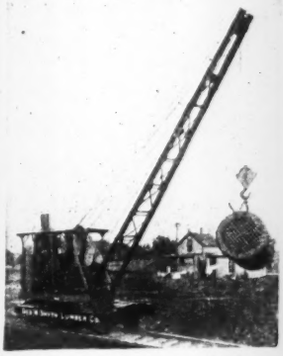

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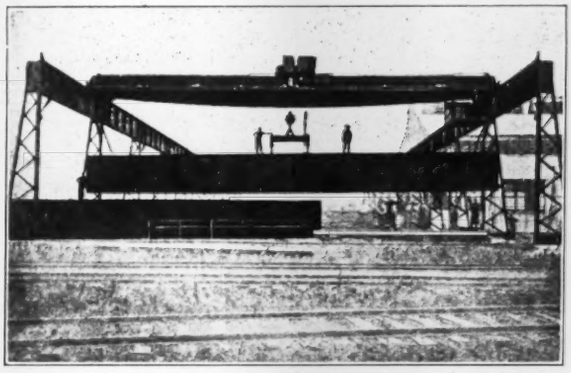

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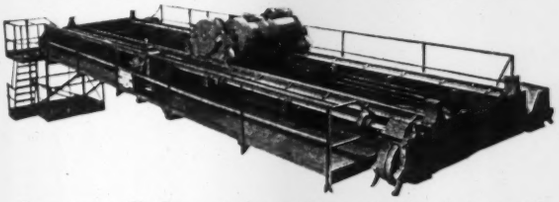

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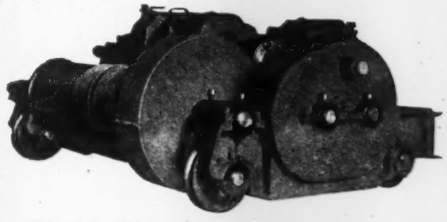

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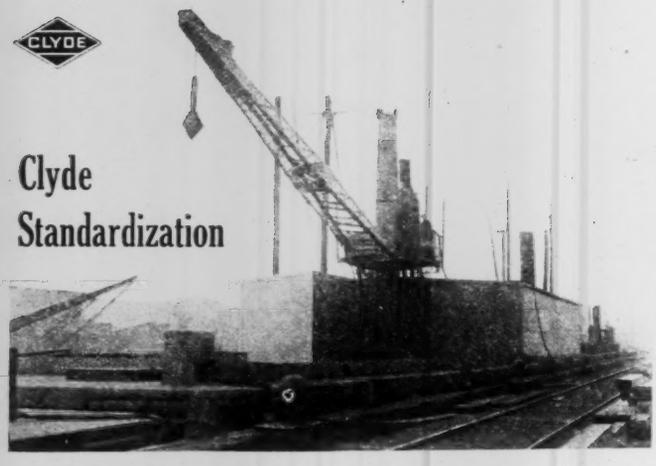

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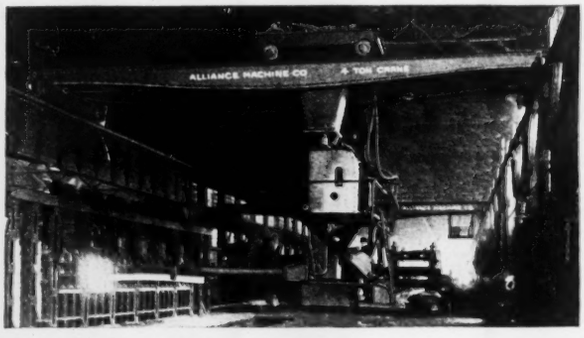

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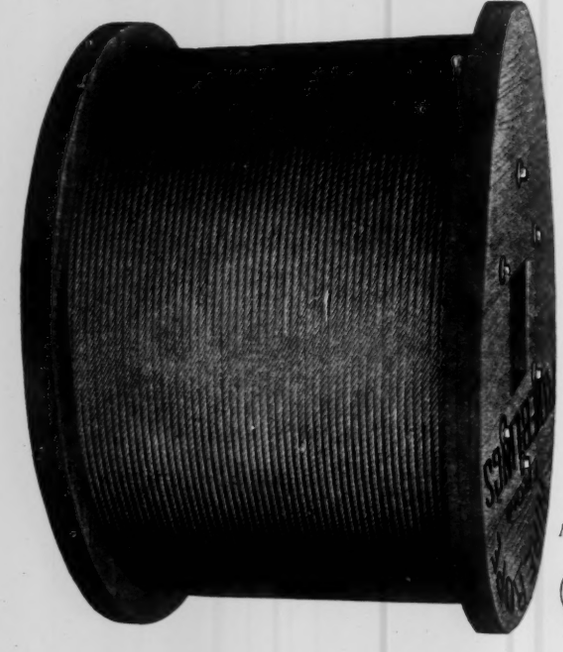

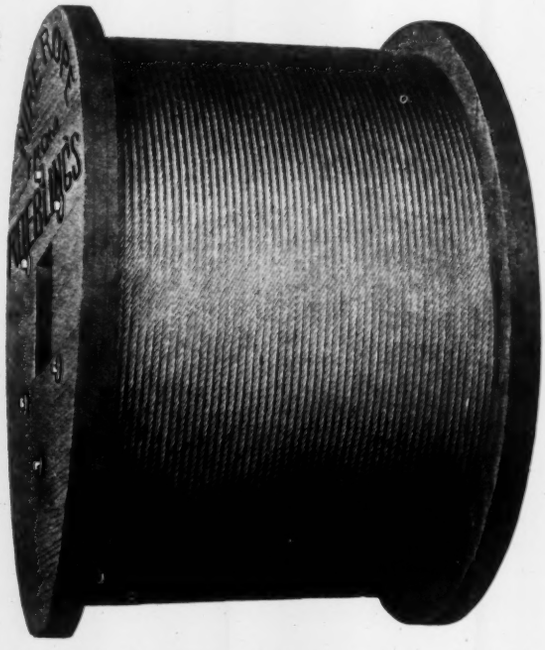

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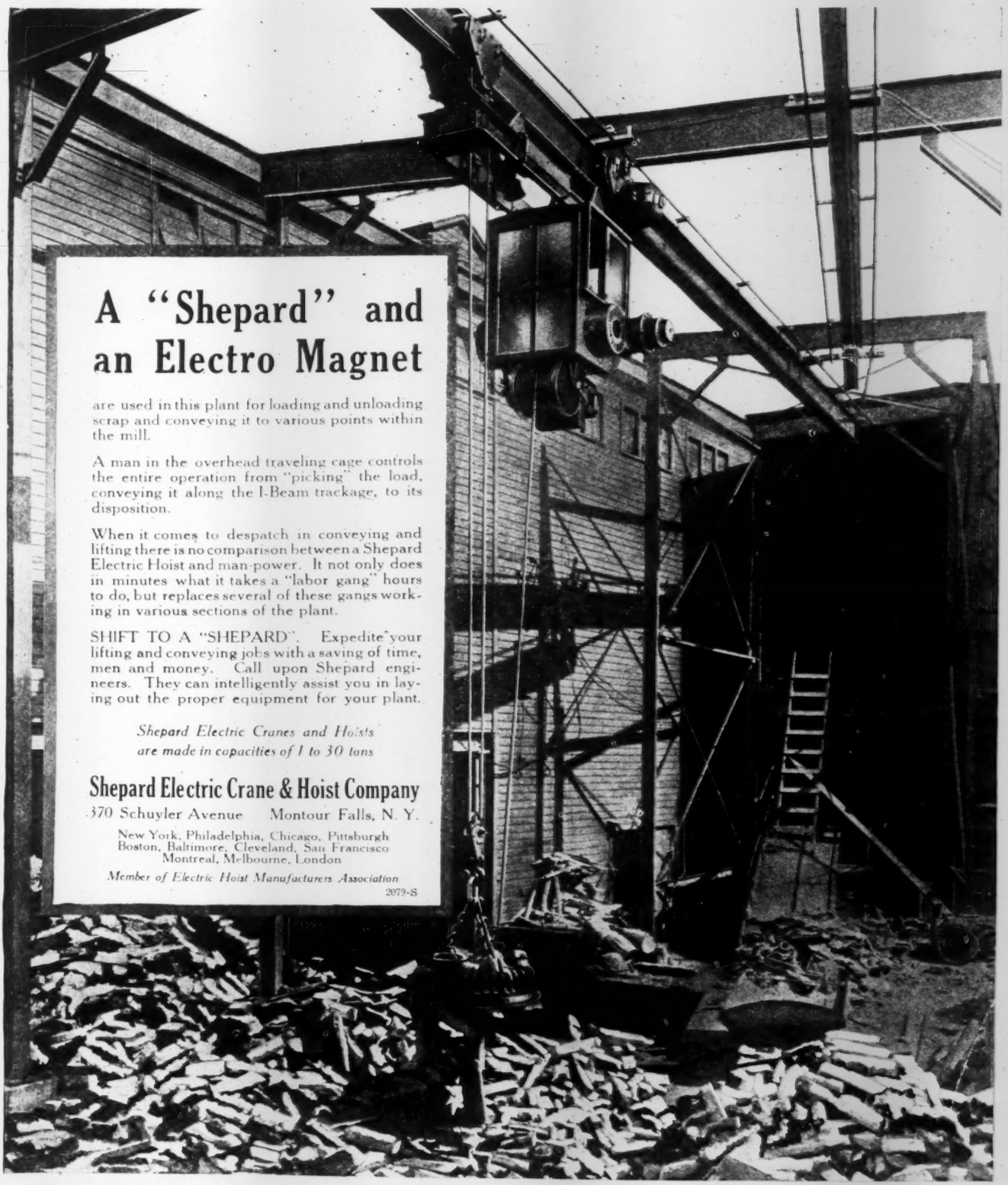

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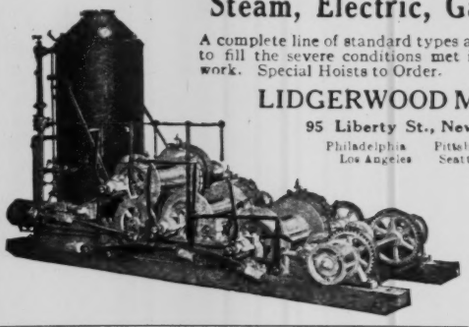

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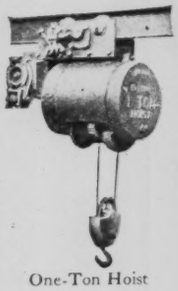

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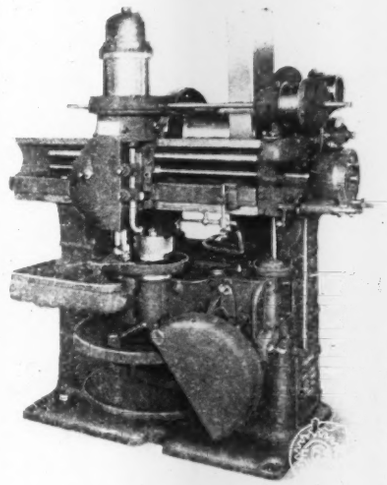

This machine works on the generating principle, using a generating cutter that is ground all over after hardening, including the involute curves on the teeth which are generated with a precision that is beyond question.

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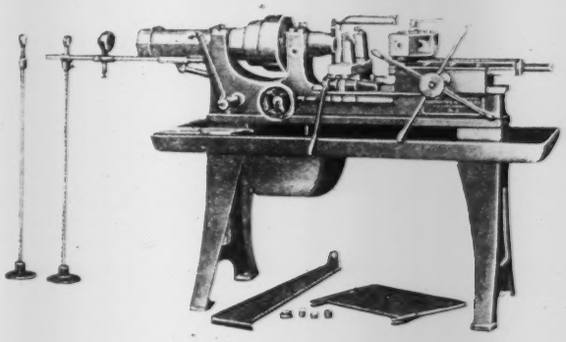

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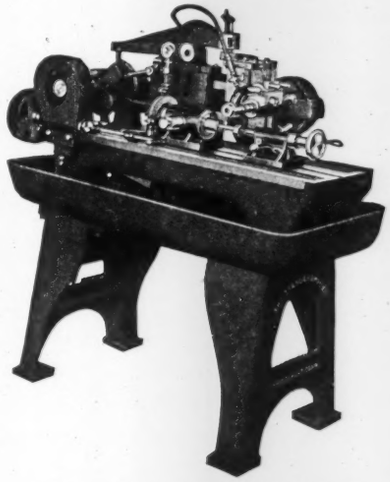

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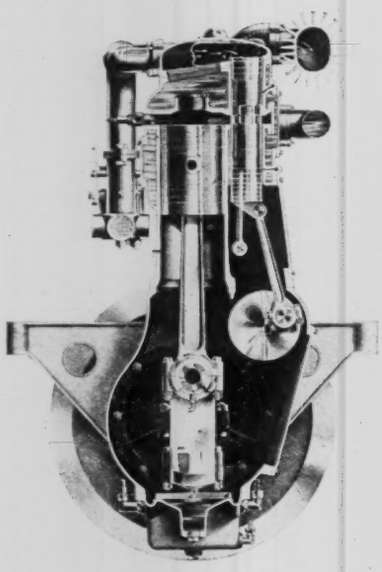

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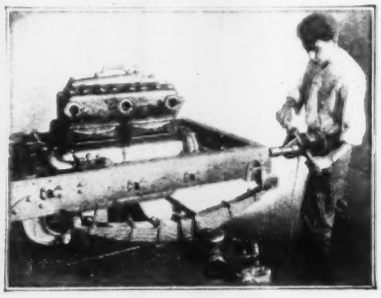

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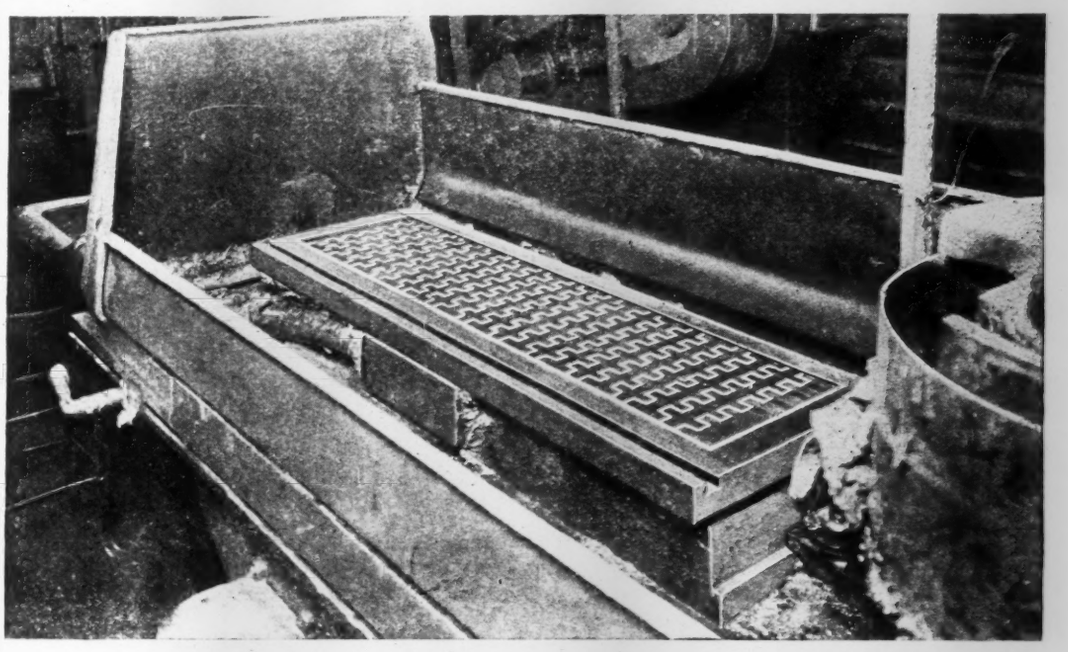
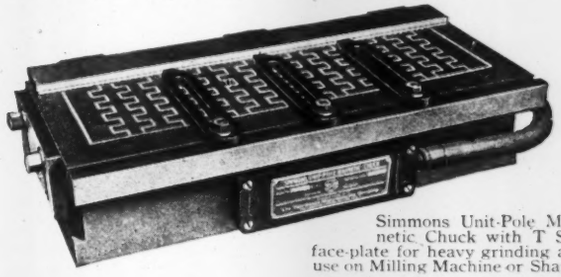
SHEARS PUNCHES SAWS

Three Years' Continuous Service On Wet Grinding Simmons Unit-Pole Magnetic Chuck



Above is shown a 31" Simmons Unit-Pole Magnetic Chuck that is in use to-day after being in continuous service on wet grinding for the past three years without trouble of any kind.

Simmons Unit-Pole Magnetic Chucks are so constructed that when used for wet grinding water cannot leak through the top or base to interfere with the holding power or the windings.



Simmons Unit-Pole Magnetic Chuck with T Slot face-plate for heavy grinding and use on Milling Machine or Shaper

The patented method of insulation prevents leakage of magnetism into the machines and tools. The demagnetizing switch completely demagnetizes the face of the chuck so that the work can be readily removed.

The Simmons Unit-Pole Magnetic Chuck is the only unit coil multiple pole magnetic chuck on the market equipped with a detachable and interchangeable face-plate that has no dead spaces on the holding surface.

After the face-plate becomes worn through use or in any manner is damaged, a new one can be substituted with the assurance that it will properly fit the old base.

All parts are made interchangeable, including the coils. In case it becomes necessary to replace a coil, the old coil can be readily removed and a new one inserted.

Other interesting features are fully described in Bulletin 107-N

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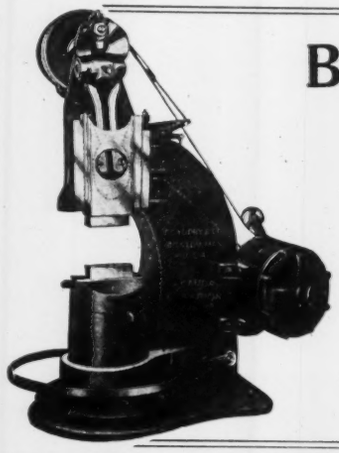
Vanadium Quality Springs

The springs that spring longest



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Belt or Motor Driven.

Our new Catalog will interest you.

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Oliver Bldg.
BOSTON MASS.

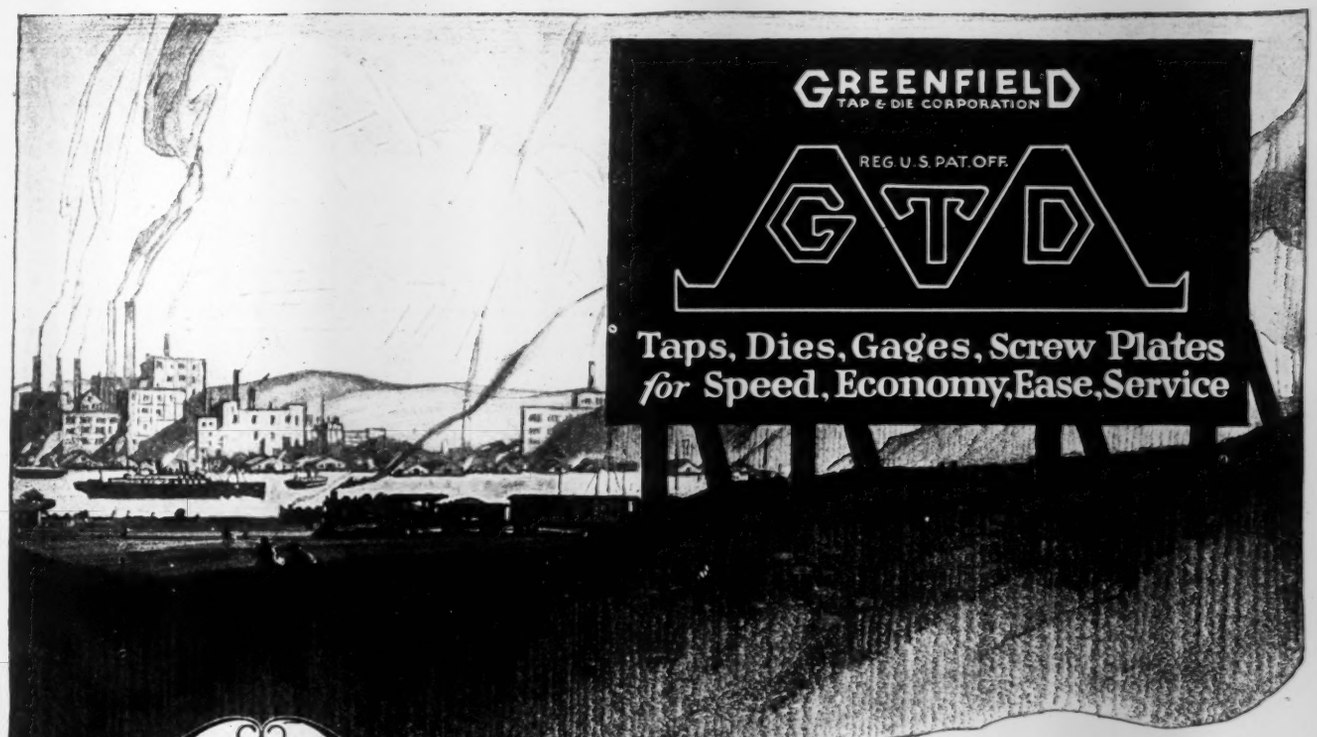
The Two Steps to a 30% Stronger Set Screw

PICTURED AT LEFT is the process that gives ALLEN Safety Set Screws 30% extra strength over *broached* hollow screws—the only other kind made. The "blank" screw under the punch press view, with the *extra thickness of metal* around the hole, is inserted in a die and brought into position under a hex punch. The punch fits into the clean drilled hole, drives the blank through the die, drawing the metal *cold* and forming a hexagon socket (see second view of blank). The increased density of the steel around the socket-hole increases the strength of the screw fully 30%. And the clean, deep socket has *no chips* in the bottom of the hole.

The second process (right-hand view) illustrates how ALLEN Screws are "Tested as They're Made." A "hex" drive inserted in the socket-hole of the blank turns the latter through a threading die. The torsional strain of threading falls wholly on the socket of the screw — with no solid containing part to prevent screw from bursting out. This test plainly exceeds any test of practical use, where the screw is set-up with a hand wrench, in a solid containing part.

These processes are exclusively ALLEN—the first being patented, the second possible only with a screw of the Allen's strength. *Write for complete matter* on the service and economy features.

THE ALLEN MFG. CO. 131 Sheldon St., Hartford, Conn.



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No. 147A

Westinghouse

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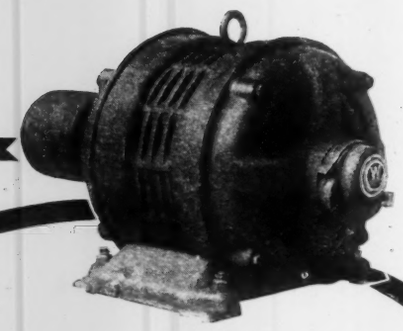
Machine Tool Motors and Control



Type "CS"

constant speed
alternating current

Sometimes the Buyer Does Not Consider Details

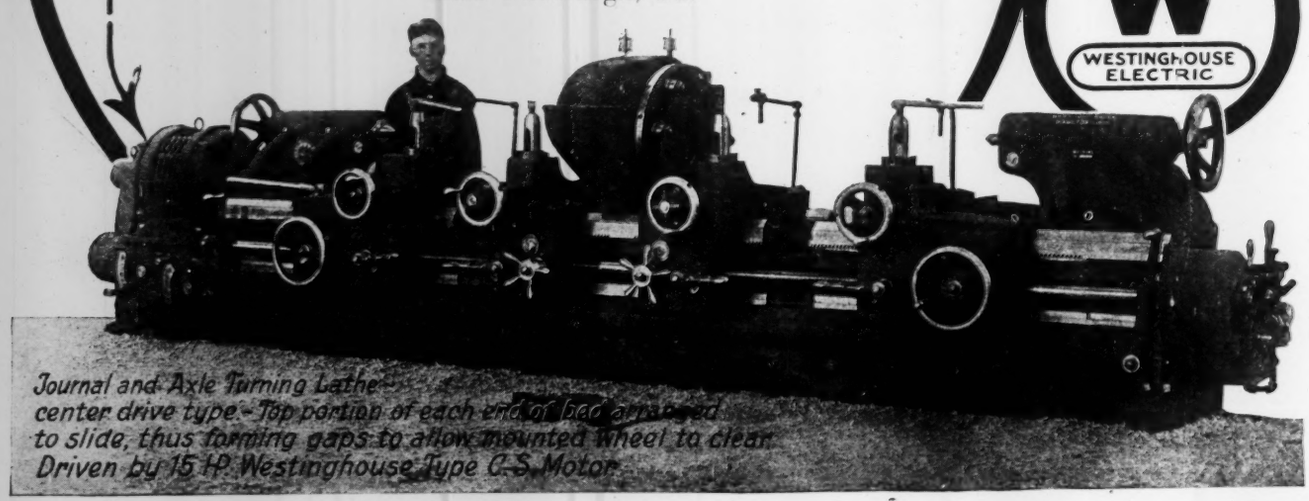
Since, however, the satisfactory performance of a motor depends upon the satisfactory working, and enduring qualities, of its detail parts, we want all users of machine tools, and machine tool builders, to know how the Westinghouse Type CS Motor is constructed.

The Type CS is a simple motor, having but five principal parts — stator, rotor, shaft, and two bearing brackets.

While a complete description is too long for this space, a four-page leaflet, WELL ILLUSTRATED, will tell you the whole story.

Ask for Leaflet 1160.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.



Journal and Axle Turning Lathe — center drive type. Top portion of each end of bed arranged to slide, thus forming gaps to allow mounted wheel to clear. Driven by 15 HP Westinghouse Type C.S. Motor.

Pacific Machinery Review (*San Francisco*)
WILL ISSUE, ABOUT DECEMBER FIFTH, A

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of the Machinery, Iron and Steel, Engineering and Allied Industries

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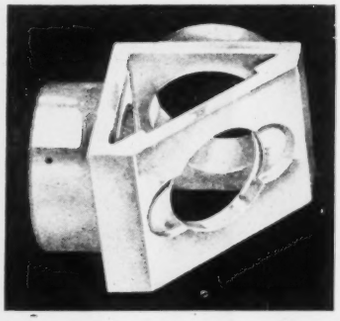

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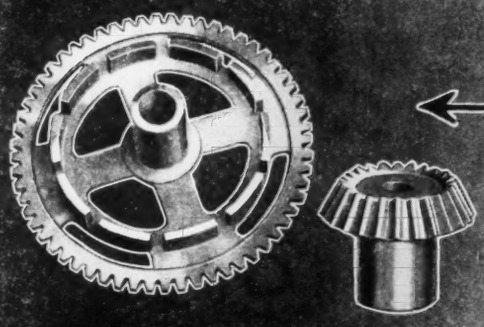
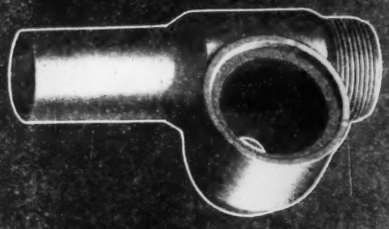


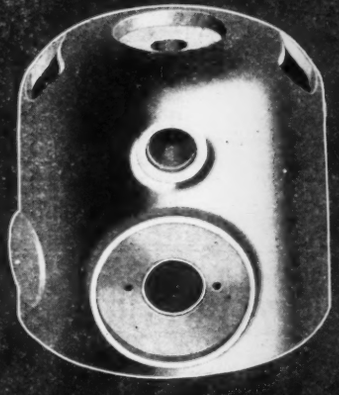
Perfect Gear Teeth

Teeth on small gears and pinions, die-cast by the Stewart process, are perfect in shape. They are clean and regular, without rough edges. Stewart die-cast gears and pinions run smoothly.



Accurate Threads

Threads can be die-cast to machined accuracy. No rough places, no burrs, no uneven threads. Small parts, with threads for any purpose, can be die-cast by the Stewart process.



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Cored holes are exactly centered, perfectly round and are clean inside. Stewart die-castings are absolutely uniform in shape, size and quality of metal used.

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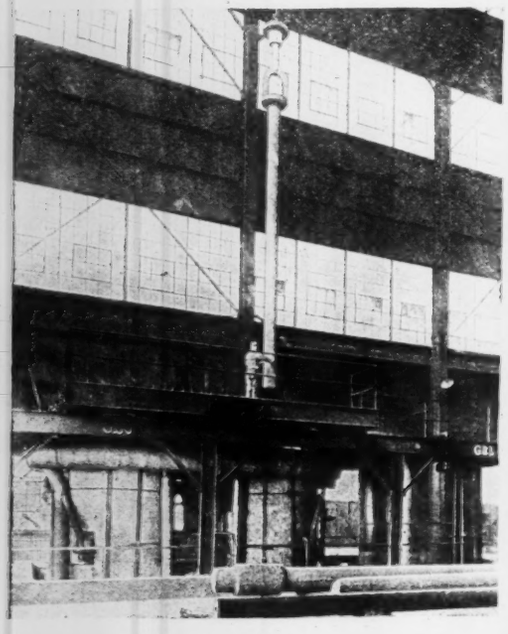

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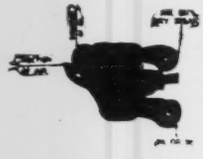

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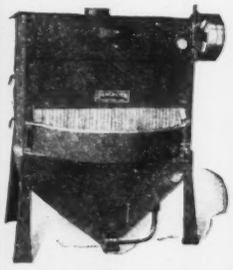

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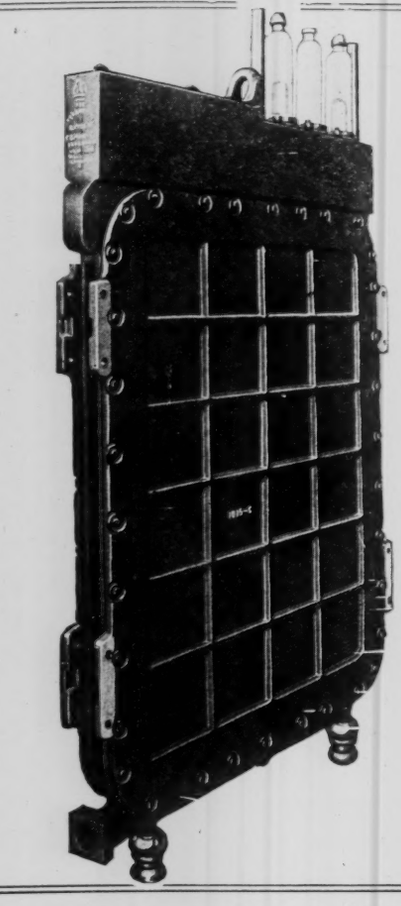

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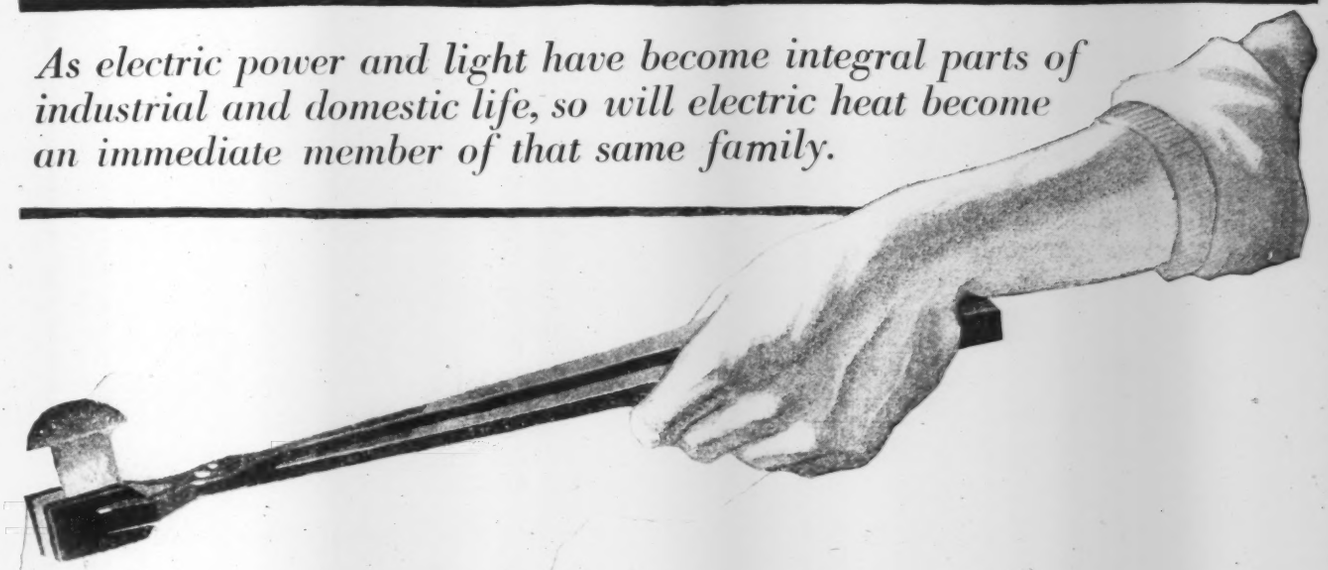

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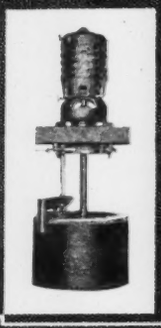

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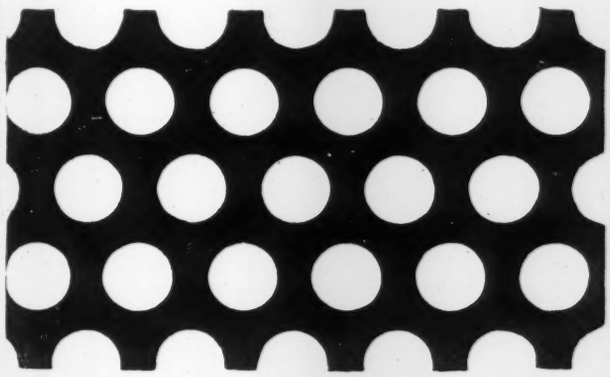

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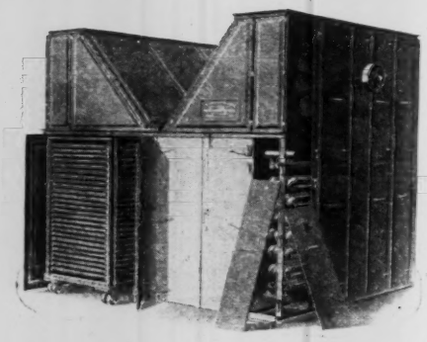

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The "Proctor" Drying Machine for China Clay, Porcelain Insulators, Chemical Stone Ware, Pottery, Sanitary Ware and similar materials

A General Description of Standard "Proctor" Ceramic Dryers

A standard "Proctor" Ceramic Drying Machine consists of an enclosure in which the wet ceramic products are supported on trucks. Heated air, violently circulated across or through the ware by means of steel blade fans, extracts the moisture from the wet materials.

The patented "Proctor" system of recirculation of the heated air is responsible for a great part of the economy and efficiency of the machine. By this recirculation the hot air is used over and over again, passing alternately through the heated pipes and the wet material on the trucks. A moderate supply of fresh air is admitted to the inside of the dryer while a corresponding amount of saturated air is exhausted by means of flues. This is economical in steam consumption, as the volume of cold air required is comparatively small.

A saving in the time required to dry the wet ware is made as well as in the amount of labor necessary and in the floor space required for the drying process.

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"Proctor" Dryers are built in various types, sizes, and capacities for drying the following materials:

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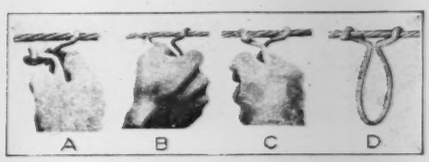

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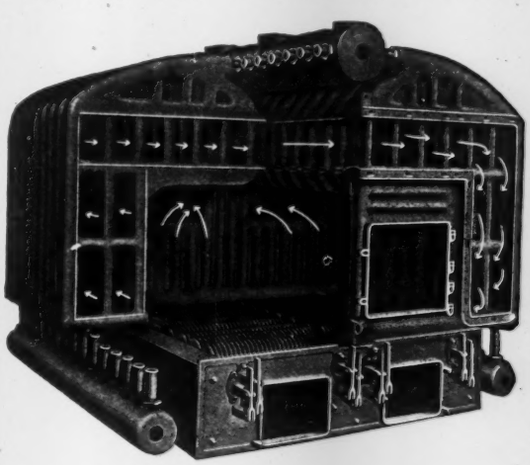

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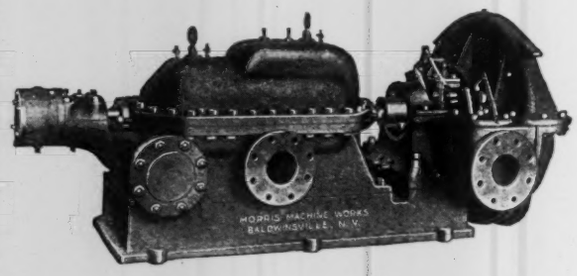

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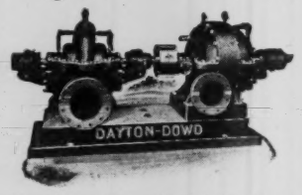

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Furnished with pulleys for belt drive as shown or for gear connection to electric motor or other driver.

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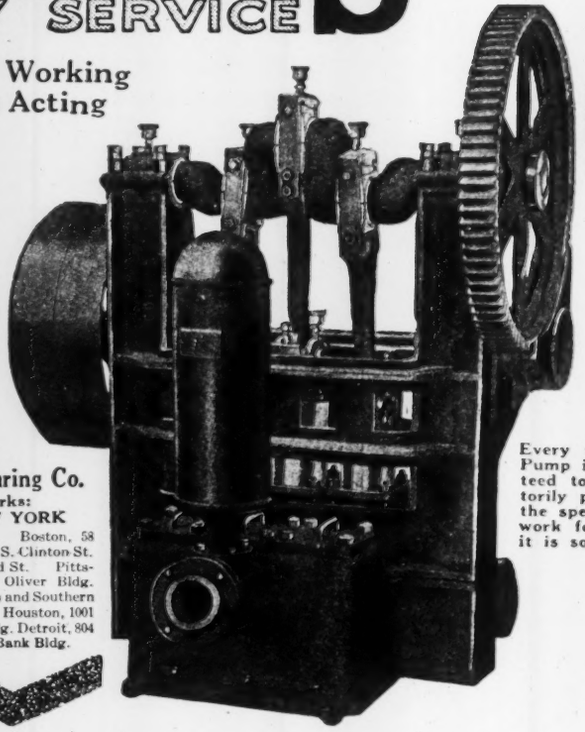

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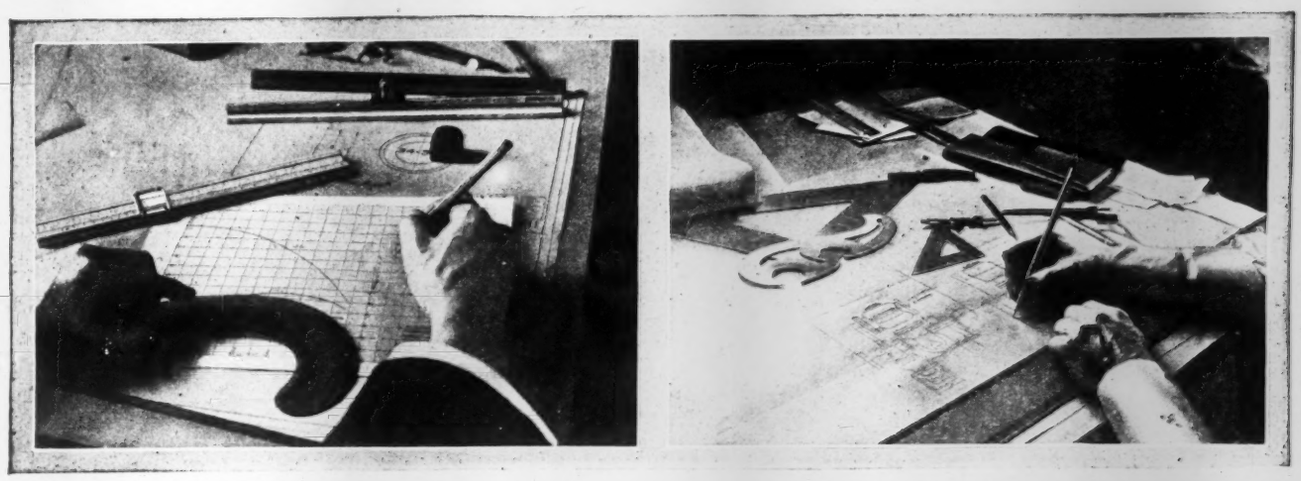

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is not an unknown quantity, not merely an estimation—however exact—figured from the drafted design. Their capacity against the given head is a proved fact—demonstrated by accurate test under conditions identical with those in which the pump is to work. The test proves the design.

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FOR THE ENGINEER: H-4 is a complete description of the testing of Lea-Courtenay centrifugal pumps with data on types and installation. Mailed on request.

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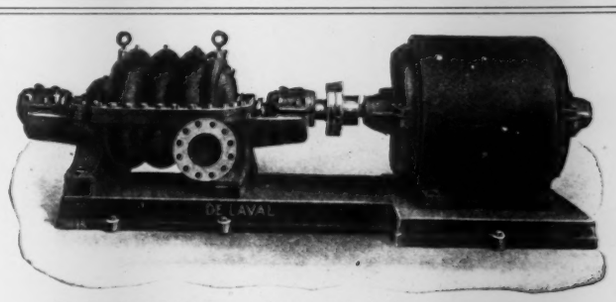

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The De Laval Centrifugal Pump has a power-limiting characteristic; that is, it will not take more than a certain amount of power from the motor, no matter how much the discharge is opened.

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Induction motors, at less than rating, have a low power factor, a low efficiency, and a high cost. Poor power factor requires greater current flow and increases line and generator losses. It also reduces available generator capacity and causes bad voltage regulation.

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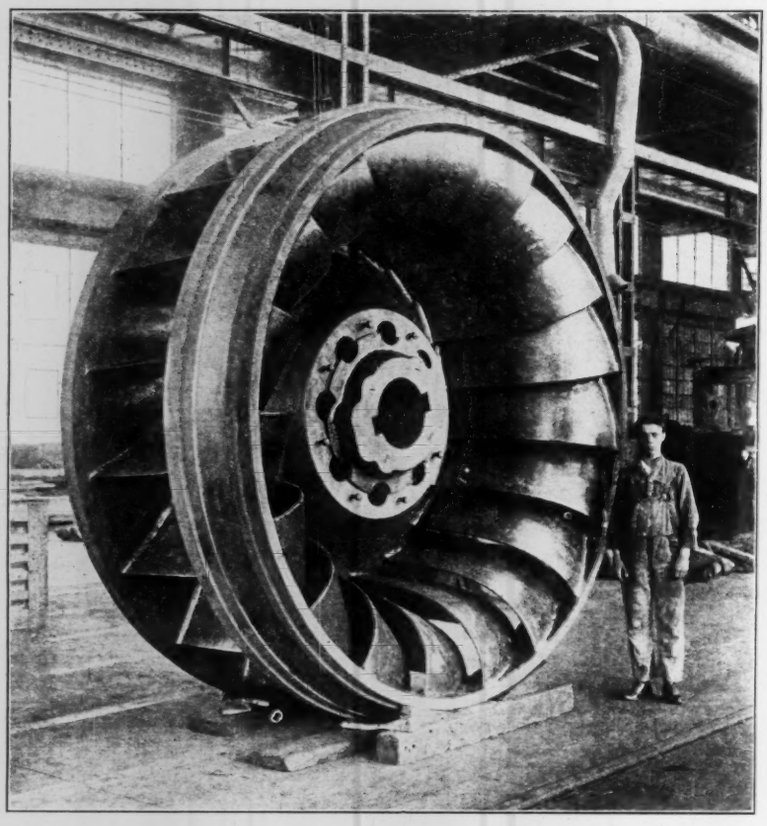

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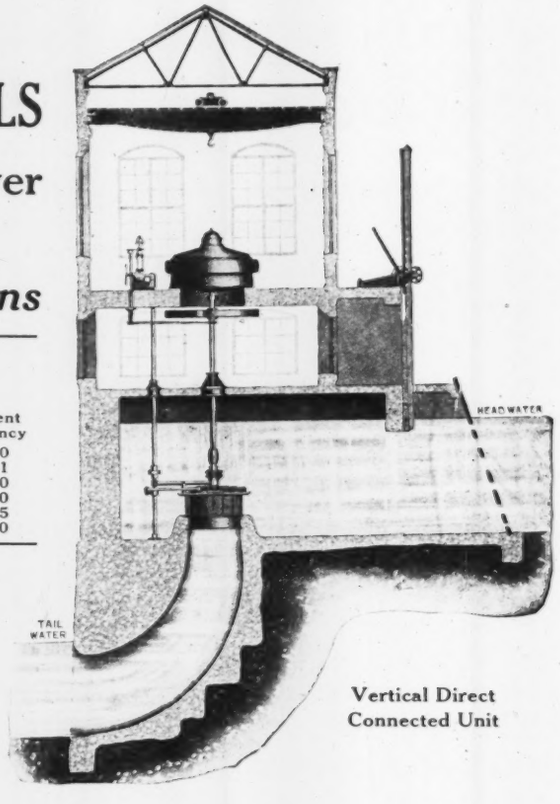

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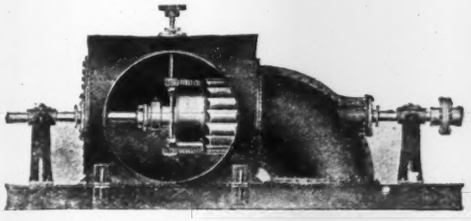

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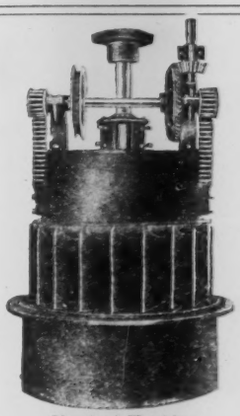

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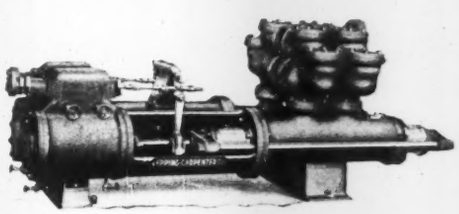

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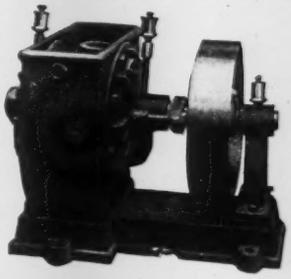

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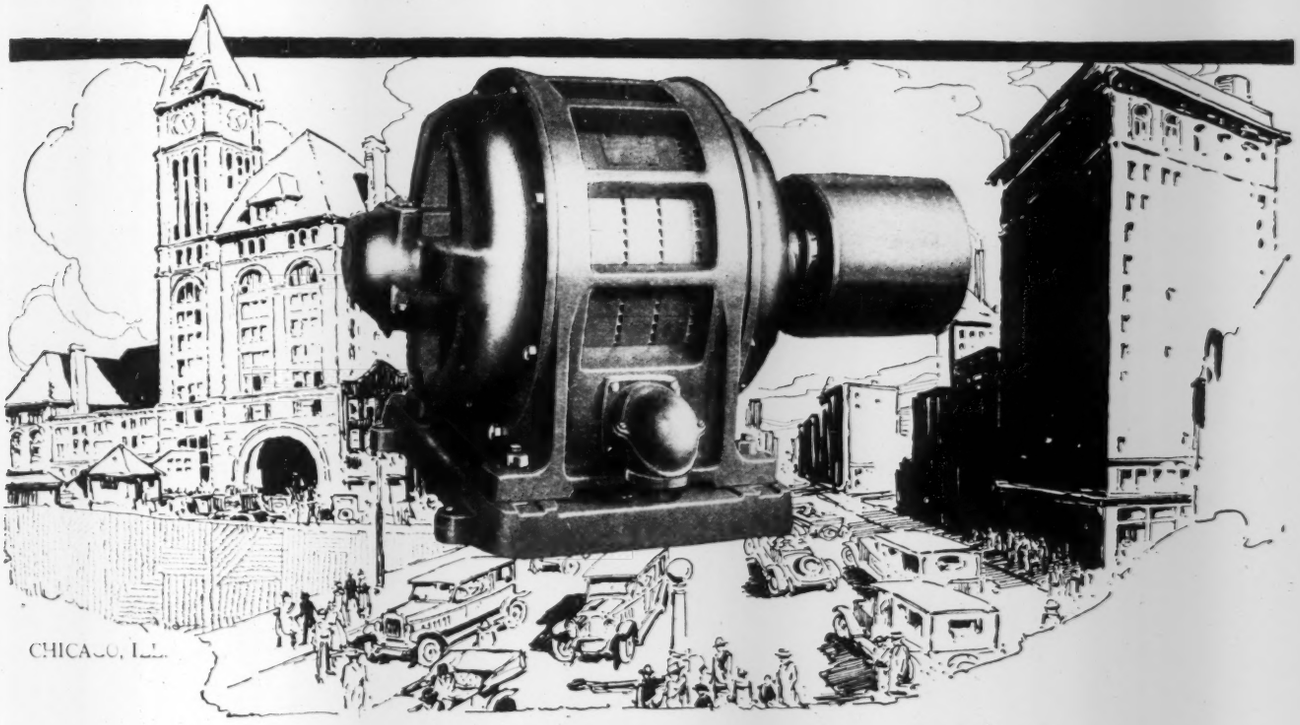

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*Green Fuel Economizer Co	32b
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*Morse Chain Co	34b
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*National Pipe Bending Co	44
*National Supply Cos	53
*National Tracing Cloth Co	28b
*Nelson Valve Co	—
*New Britain Machine Co	—
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*Union Iron Works	32
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*Warner & Swasey Co	2b
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*Weston Electrical Instrument Co	58
*Wheeler Condenser & Engrg. Co	47
*Wickes Boiler Co	32
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*Wood's Sons Co., T. B	60
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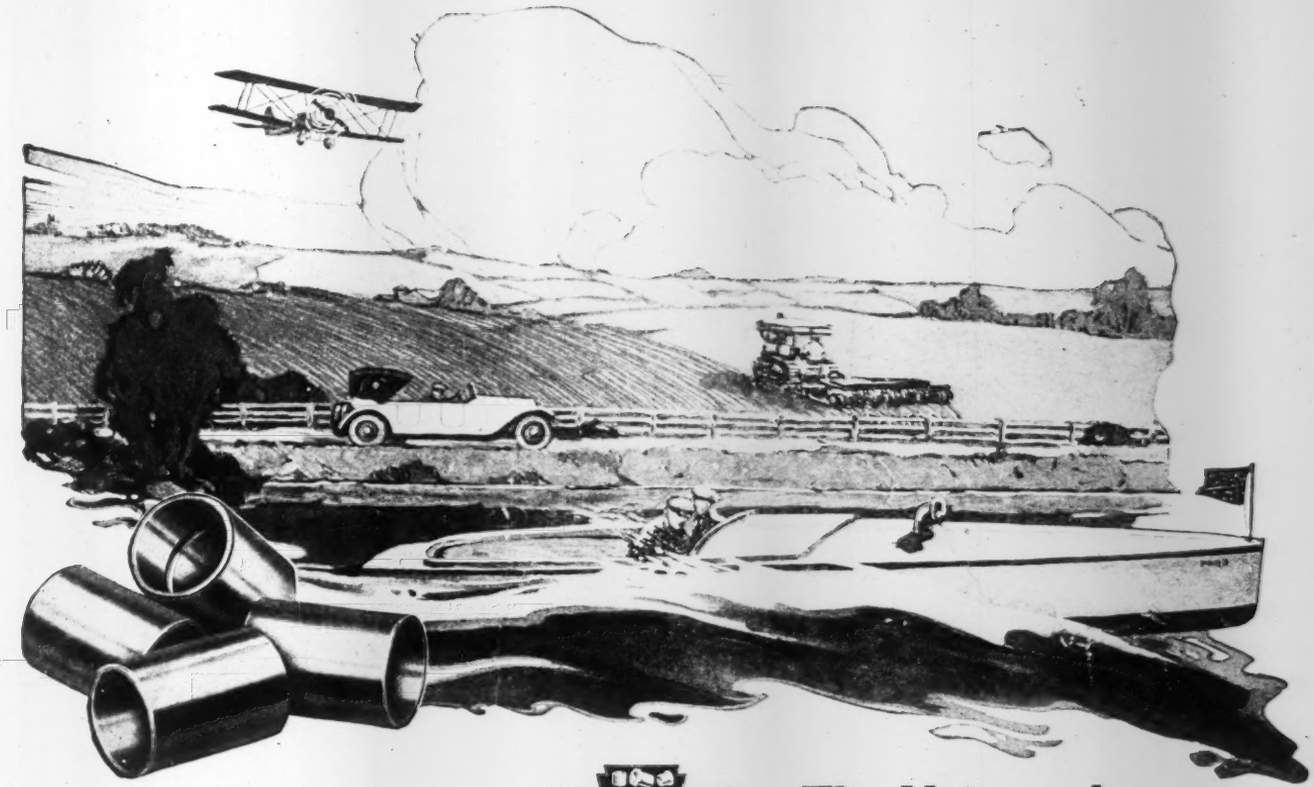
*Catalogue data of firms marked * appear in the A. S. M. E. Condensed Catalogues of Mechanical Equipment, 1919 Volume*



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NON-GRAN —*The Universal Bearing Bronze*

IN the weighty motor truck, speedy airplane, motorcycle or motor boat—in the quality motor car, the productive tractor or machine tool—there you'll find Non-Gran Bearing Bronze resisting the grind of friction and keeping machines in service longer by postponing bearing renewals. Non-Gran is truly destined to be "The Universal Bearing Bronze."

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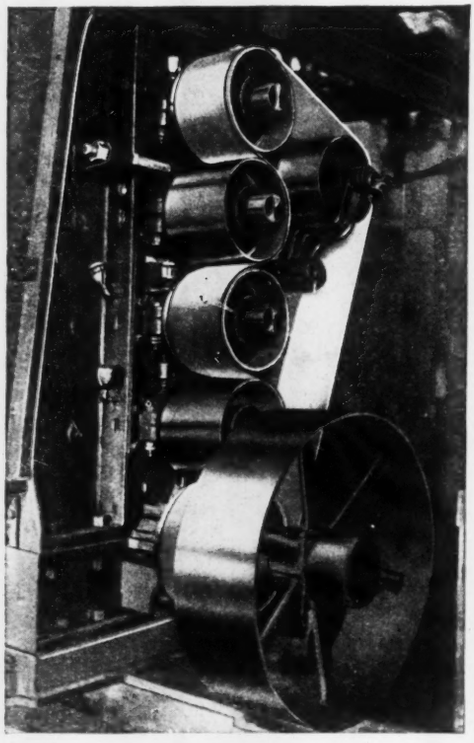
A drive like this will "test the metal" of any belt, but DUXBAK meets the conditions successfully



It is a roll drive on an Oil Mill, and one glance at the pulley arrangement will show you it is a hard one.

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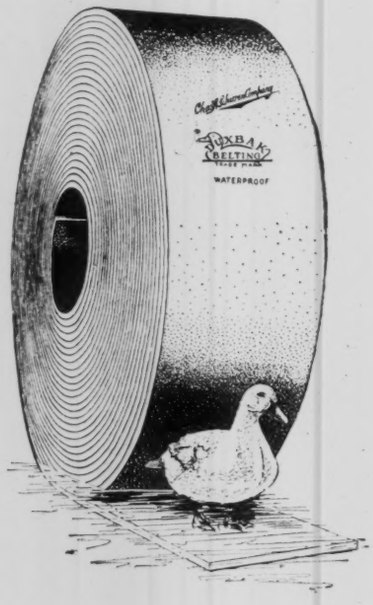
"DUXBAK" is a favorite for the job.

Maybe you have a drive somewhere—small pulleys, high speeds, severe atmospheric conditions—that you consider impossible for belting? Try "DUXBAK"—for service and economy.



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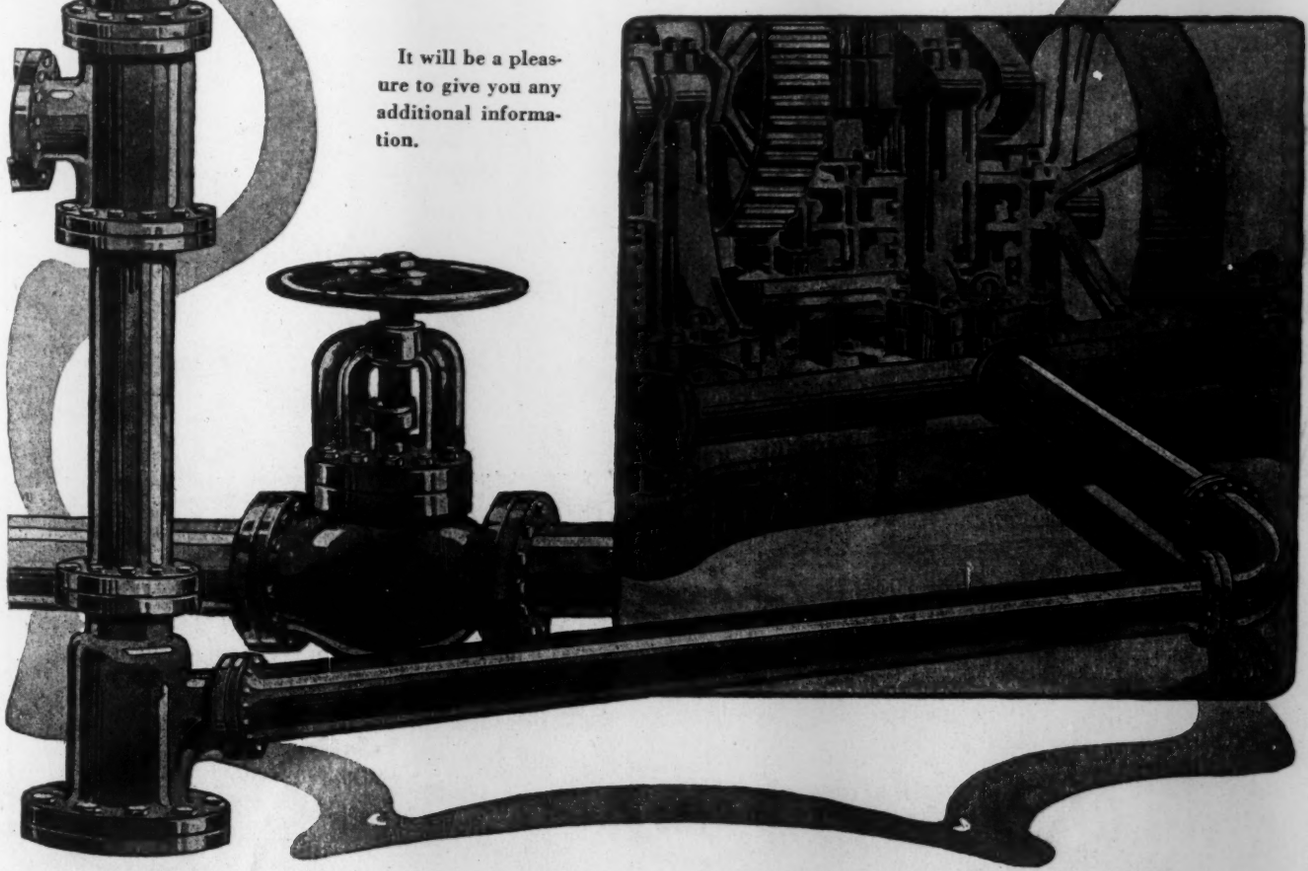

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